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*Pison* in the New World: a revision  
(Hymenoptera: Sphecidae: Trypoxylini)

**By**

**Arnold S. Menke**





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ABSTRACT

The genus Pison Jurine in the Western Hemisphere is revised. Identification keys are provided for the forty four recognized species, all but one of which are restricted to the Neotropical Region. All species are described, diagnosed, and their geographic ranges outlined. Illustrations accompany the key and descriptions. Twenty nine new species are described: abathes (Ecuador, Bolivia, Guyana), abothrum (Colombia, Brasil), arachniraptor (Panama to Bolivia, Brasil), aranevorax (Colombia, Ecuador, Peru, e Brasil), brasilium (Brasil), chrysops (Costa Rica to Argentina), cooperi (Costa Rica to n Bolivia, c Brasil, Dominica), delicatum (South America), dementia (se Brasil), doggonum (Mexico), eu (Mexico to Peru & Suriname), euryps (Colombia, Brasil, Argentina), erebus (Colombia), eyvae (Colombia, Ecuador, Bolivia), fritzi (Ecuador, Brasil, Argentina), gnythos (Colombia, Ecuador, Guyana, Trinidad), larsoni (Ecuador, Peru, Bolivia), lillo (Argentina), longicorne (Mexico to Argentina), martini (Ecuador), nosferatu (Venezuela), oaxaca (Mexico), pentafasciatum (s Brasil), phthinylla (Ecuador), sphaerophallus (Colombia, Ecuador, Peru, Guyana, Suriname, n Brasil), styphopteron (Colombia, Peru), sylphe (Peru), vincenti (Ecuador, Guyana), and wasbaueri (Argentina). One species is synonymized: flavolimbatus Turner, 1917 = cressoni Rohwer, 1911. Pison laeve Smith, known only from its type specimen and sometimes treated as a North American species, is interpreted as an Australasian taxon and a diagnosis based on the type is presented.

Twelve species groups are established for the New World fauna, but the use of subgenera is abandoned. Three generic names that have been treated as subgenera in the past, Pisonoides Smith, Krombeiniellum Richards, and Entomopison Menke are placed in synonymy with Pison. Some characters that are important from a phylogenetic standpoint in Pison and related genera are analyzed to determine polarity. Incorporation of the Crabroninae with the Larrinae is discussed. The status of Pisonopsis as a genus is reviewed, a new generic character described, and a key to its five species is presented. Two new species of Pison are described from New Guinea that are important for an understanding of generic limits: woji and pistillum.

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## INTRODUCTION

The spider predator genus Pison Jurine is cosmopolitan, but in the Western Hemisphere it is essentially a neotropical taxon. All but one of the 44 species treated here are restricted to that region. The only nearctic species, agile (Smith), is not native; it was introduced into northeastern North America from the Orient during World War II. Another species attributed to the North American fauna, laeve Smith, appears to belong in the Indoaustralian area based on my examination of its type (see Appendix, p. 90).

This study has been based on 1580 specimens of Pison from the Western Hemisphere, of which 484 were chilense Spinola, a commonly collected endemic in Chile and Argentina. When I began my review of the genus, only 15 neotropical species were known, but I now recognize 43 species in the region, 29 of them new. This swells the world total for Pison to somewhere around 200 described species making it one of the larger genera of Sphecidae. More neotropical species await detection, perhaps as many as 20, and of course the large Australian fauna has yet to be subjected to a modern review. Worldwide, the genus may eventually contain nearly 300 species.

This revision has to be considered as only a beginning framework for several reasons. Some species are known only from one sex or even one specimen. I have studied a number of specimens that represent additional undescribed species, but I have not attempted to describe them because they are singletons and are in a species group (the cressoni group) whose species are often difficult to distinguish even when a lot of material is available. Furthermore, several species treated here may ultimately prove to be complexes. Finally, in a few instances I have been able to separate males, but their corresponding females seem identical. Clearly much more collecting is needed before a definitive revision can be achieved. Such a revision will also require rearing of nest material to positively associate sexes.

I have not attempted a comprehensive phylogenetic analysis of the New World fauna of Pison. Such an analysis would have to be considered preliminary because the very large Australian fauna (about 50 named species of Pison), which may have some Gondwanian links with the South American fauna, is poorly known, and the rest of the world species of the genus are not well documented morphologically. Lack of a comprehensive world collection of Pison, as well as time constraints imposed on my study, have precluded an in-depth world survey of the genus. I have analyzed a number of characters, however, that are phylogenetically and morphologically important in the genus, in the Trypoxylini, as well as in the Larrinae. I have concluded that the Crabroninae should be incorporated with the Larrinae.

In the Appendix at the end of this paper I describe two new species of Pison from New Guinea that are important from the standpoint of understanding the morphological diversity in the genus. A key to the five species of the New World genus Pisonopsis Fox, a taxon separated with difficulty from Pison, is also found in the Appendix.

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- AEI – American Entomological Institute, Gainesville (Henry Townes).  
 AMNH – American Museum of Natural History, New York (Marjorie Favreau).  
 BERLIN – Zoologisches Museum der Humboldt Universität, Berlin (Eberhard Königsman, F. Koch).  
 BMNH – British Museum (Natural History), London (Colin Vardy, Michael Day).  
 BPBM – Bernice P. Bishop Museum, Honolulu (Gordon Nishida).  
 CAS – California Academy of Sciences, San Francisco (Wojciech Pulawski).  
 CMP – Carnegie Museum, Pittsburg (George Wallace).  
 CNC – Canadian National Collection, Ottawa (Lubomir Masner).  
 COOPER – Martin Cooper Collection, Lyme Regis, Dorset, England  
 CSDA – California State Department of Agriculture, Sacramento (Marius Wasbauer).  
 CU – Cornell University, Ithaca (George C. Eickwort).  
 DIAS – Bráulio F. de Souza Dias Collection, Fundação IBGE, Brasília.  
 FRITZ – Manfredo Fritz Collection, Salta, Argentina.  
 FSDA – Florida State Department of Agriculture, Gainesville (Lionel Stange).  
 GEMBLOUX – Faculté des Sciences agronomiques de l'Etat, Gembloux (Jean Leclercq).  
 GENEVA – Muséum d'Histoire Naturelle, Geneva (Claude Besuchet).  
 HALLE – Martin Luther Universität, Halle, East Germany (J. O. Hüsing).  
 HEH – Henry Hespenheide Collection, Los Angeles.  
 IBGE – Fundação IBGE, Brasília (Bráulio de Souza Dias).  
 KU – University of Kansas, Lawrence (George Byers, Robert Brooks, John Wenzel).  
 LECLERCQ – Jean Leclercq Collection, Liège, Belgium (Jean Leclercq).  
 LEIDEN – Rijksmuseum van Natuurlijke Historie, Leiden (Kees van Achterberg).  
 LILLO – Instituto Miguel Lillo, Tucuman (Abraham Willink, Lionel Stange).  
 MCZ – Museum of Comparative Zoology, Cambridge, Mass. (James Carpenter).  
 MLSU – Zoological Museum of the Moscow Lomonosov State University, Moscow (Alexander V. Antropov).  
 OSU – Oregon State University, Corvallis (George Ferguson).  
 PARIS – Muséum National d'Histoire Naturelle, Paris (Simone Kelner-Pillault).  
 PMA – Provincial Museum of Alberta, Edmonton (Albert Finnamore).  
 RAW – Anthony Raw Collection, Brasília.  
 UCD – Richard M. Bohart Museum, University of California, Davis (Robert Schuster).  
 UCM – Universidad Central de Venezuela, Maracay (F. Fernández-Yépez).  
 USNM – National Museum of Natural History, Washington DC. (Arnold Menke).  
 USU – Bee Biology and Systematics Lab., USDA, Utah State University, Logan (Terry Griswold).  
 VIENNA – Naturhistorisches Museum, Vienna. (Max Fischer)  
 ZMC – Universitets Zoologiske Museum, Copenhagen (Ole Lomholdt).

## METHODS AND TECHNIQUES

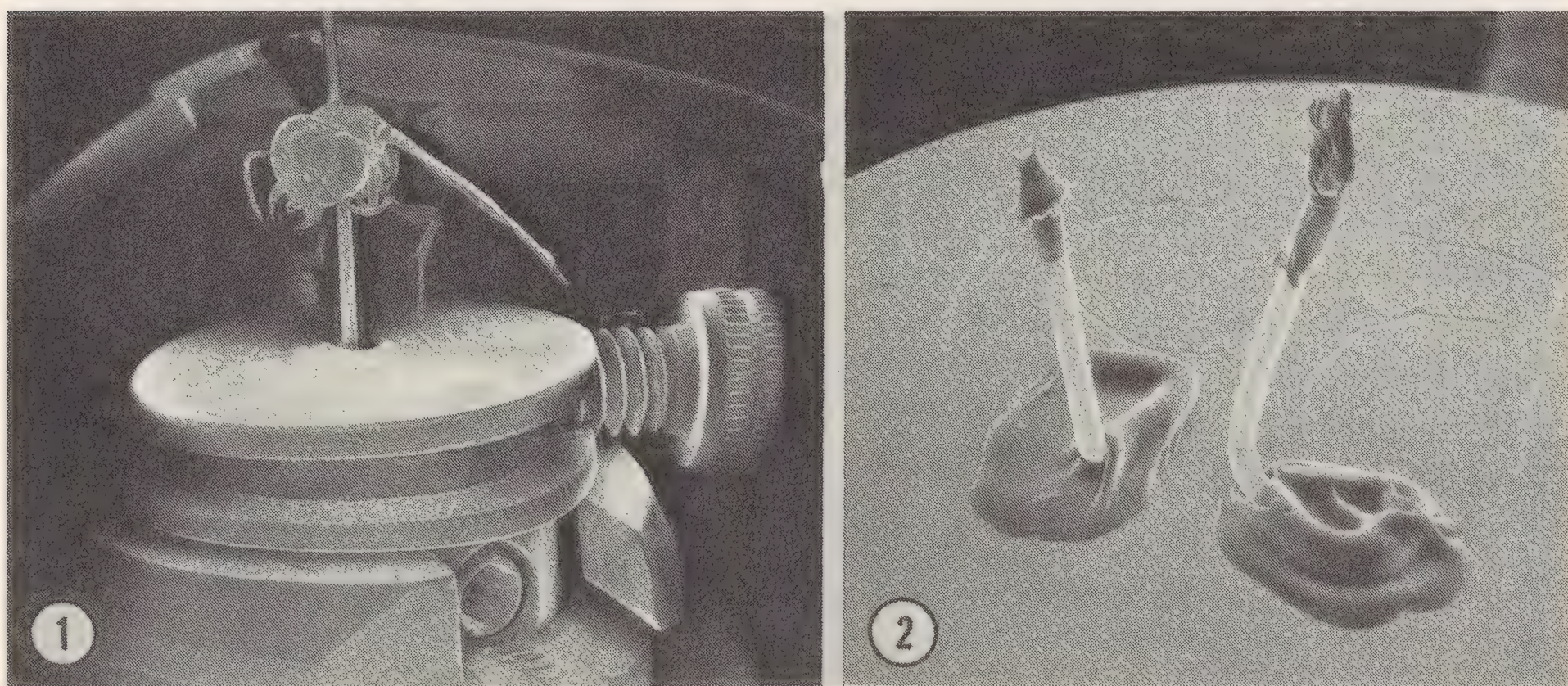
I have not provided complete label data for all species. For common, described taxa I have given only the country, province, and locality followed by the abbreviation of the owner of the material in parentheses. The number and sex of specimens from any one locality is usually given only for new species; males are noted however, for species in which that sex is poorly represented. Collectors names are cited only for material of new species. Some of my new species may prove to represent complexes of two or more species. In these cases I have not always included all material studied in the paratype series. Instead atypical specimens are listed as metatypes, i.e., non-type material.



Extensive use of scanning electron photomicrographs has been made to illustrate various body parts. Genitalia and a few other structures were coated with gold palladium, but most material was photographed uncoated, particularly clypei, mandibles, and propodei. A Cambridge Stereoscan 100 set at 10 KV was used for coated material. Uncoated material was scanned at 2 KV on the same machine using a low KV anode, or occasionally on a Hitachi S-570. Uncoated specimens were held in a special stub similar to that described by Stork and Claugher (1987). This stub (fig. 1) permits leaving specimens on their pins or points during SEM work, and allows photographs of holotypes and unique material to be made without damage. Uncoated material was often soaked in an undiluted solution of the commercial cleaning agent, 409, and then run through water, alcohol, and chloroform. The last causes setae to remain erect after drying. Sometimes cleaning in chloroform was enough. Debris was removed from the body by using a small piece of Scotch Magic Transparent Tape stuck to the end of an insect pin. Dust and other small particles adhere to the tape.

Male genitalia and sternum VIII were glued to the end of fine gold wire with polyvinyl acetate (PVA) dissolved in a mixture of acetone and 99% isopropyl alcohol. The wires were then glued to standard SEM stubs with Elmer's Glue-All (fig. 2). These structures were not cleared, but were often cleaned in an undiluted solution of 409 cleaning agent. The PVA was usually nearly dry on the wire by the time it was applied to a specimen, so to facilitate adhesion of these small objects they were soaked in 99% isopropyl alcohol immediately before touching the wire to them.

A Wild M-400 photographic microscope was used to take pictures of wings and some propodei.



Figures 1-2. SEM mounting techniques. 1, stub drilled to accept insect pin to permit photography of uncoated type specimens and other unique material. 2, male genitalia and sternum VIII mounted on gold wires that are glued to standard stub.

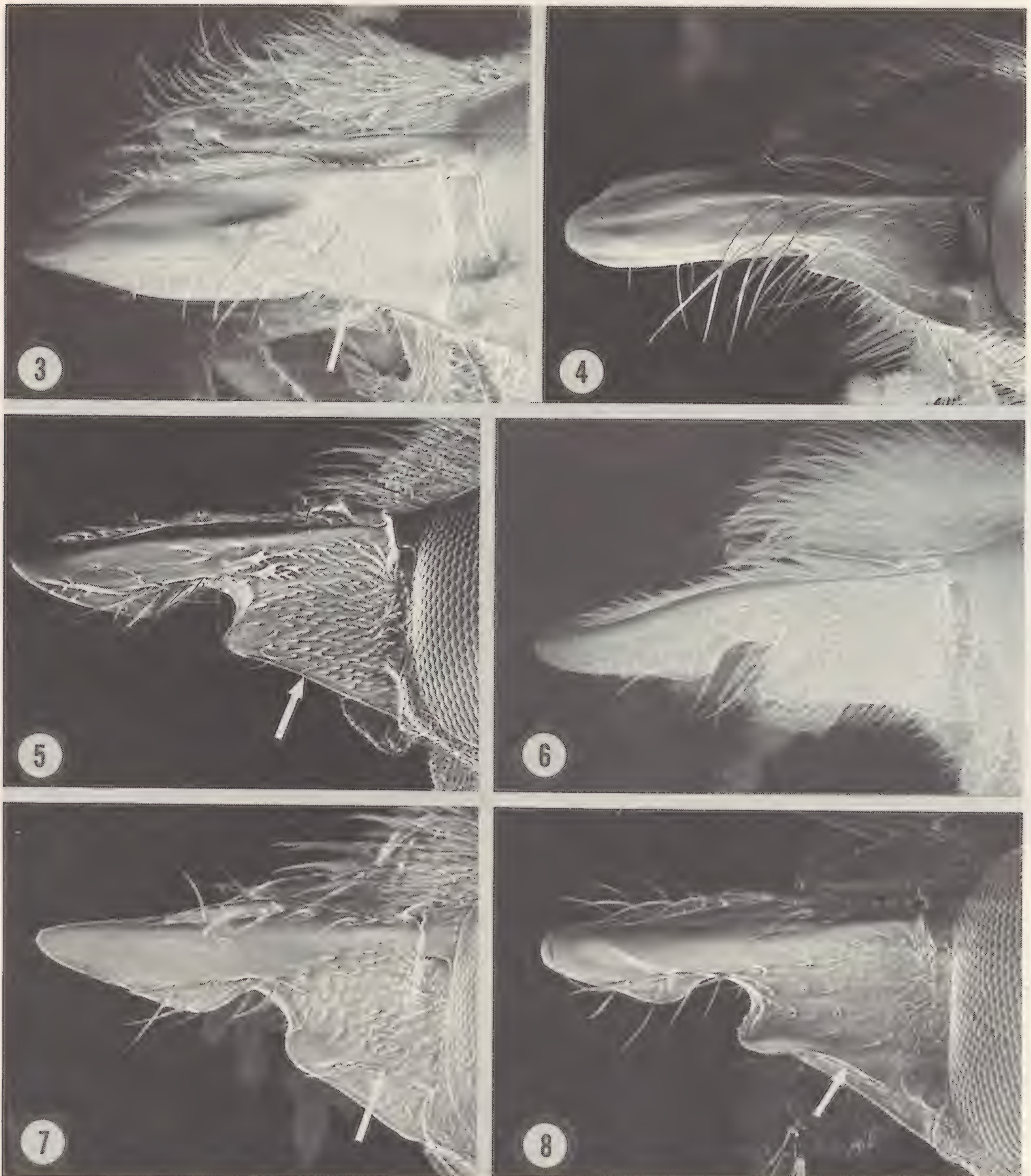
#### DISTINCTIONS BETWEEN PISON AND PISONOPSIS

These two genera are separated by rather tenuous differences (see Bohart and Menke, 1976:330). Pisonopsis has a notched mandible, but so do some Pison. However, Wojciech Pulawski (in litt.) has discovered another mandibular feature that ultimately may be the only character that will permit maintaining Pisonopsis as a discrete genus. In Pison the flattened lateral face of the mandibular base is margined posteriorly (or below depending on your viewpoint) by a rather sharp edge (condylar ridge of Michener and Fraser, 1978) that extends from the lower condyle to the notch (figs. 4-6), or to the midpoint of the much more common notchless mandible (fig. 3). This condition occurs in all other tryposyline and Larrinae that I have examined



except Pisonopsis. In Pisonopsis the lateral face of the mandible has a rounded ridge that parallels the condylar ridge of the mandible delimiting a groove (figs. 7-8). This secondary structure is best developed in clypeata Ashmead, areolata (Spinola), and australis Fritz, and it appears to be an autapomorphy for Pisonopsis. Clearly the mandible in the Sphecidae needs further study since it may offer defining features not heretofore appreciated.

The graduli found on abdominal sterna III-IV of Pisonopsis do not occur in Pison, but a practical problem of using them as a generic character is that they are often barely visible due to telescoping of the abdominal segments, and they are especially



Figures 3-8. Left mandible in lateral view. 3-6, Pison species (arrow indicates condylar ridge); 3 is arachniraptor, 4 is species from New Guinea, 5 is convexifrons, 6 is gnythos. 7-8, Pisonopsis species (arrow indicates secondary ridge); 7 is birkmanni, 8 is areolata.



weak in areolata from South America. The marginal cell of Pisonopsis is rounded apically, rather than acuminate as in most Pison. But the cell is rounded also in some Pison (eremnon for example).

The basal flagellomeres of the male antenna in Pisonopsis are asymmetrically swollen in all species. The asymmetry of the first or first and second flagellomeres is rotated 90 to 180° in relation to flagellomeres II or III-V or VI. Some species of Pison have asymmetrical flagellomeres also, and it is not clear if the male antennal structure in Pisonopsis can be used as a generic character. This needs more study.

Since no key is available for the five species of Pisonopsis, I have included one in the Appendix (p. 93). This key was partly developed by R. M. Bohart but has been revised by me and expanded to include the South America species.

### GENUS PISON JURINE

Pison Jurine (in Spinola), 1808:255. Type species: Pison jurini Spinola, 1808, monotypic. Pisonoides F. Smith, 1858:104. Type species: Pison obliteratum F. Smith, 1858, monotypic. NEW SYNONYMY.

Krombeiniellum Richards, 1962:118. New name for Paraceramius Radoszkowski, 1887:432. Type species: Paraceramius koreensis Radoszkowski, 1887, automatic. NEW SYNONYMY.

Entomopison Menke, 1968a:1. Type species: Pison pilosum Smith, 1873, original designation. NEW SYNONYMY.

The generic description in Bohart and Menke (1976:332) adequately characterizes Pison, but one character was overlooked. A nearly universal feature of the genus is a pit or transversely elongate depression anteromedially on the pronotum (figs. 16, 95). This is usually obscured by the back of the head, but it is an important apomorphic trend in Pison. I examined about 50 Old World species of Pison and only four were found to lack a pronotal depression. These were obliteratum Smith, xanthopus (Brullé), multistrigatum Turner, and kohlii Bingham. In the New World a pit is absent in the euryps and krombeini groups and a few species in the cressoni group. Trypoxylon and Pisoxylon apparently always lack these depressions. Species of Pisonopsis and Aulacophilus have either a pit or transverse depression. I have not seen material of Aulacophilinus.

The discovery of two unusual species in New Guinea (see Appendix, p. 90) complicates the traditional generic concept. These two taxa have an unusually elongate claviform first abdominal segment (figs. 347-350), and at first glance look like members of Trypoxylon. But both have three submarginal cells and two recurrent veins in the forewing (figs. 345-346), and an anterodorsal pronotal pit. Unlike nearly all Pison species, these two wasps have enlarged eye facets beneath the eye notch (figs. 341-344), a universal feature of Pisoxylon and most members of Trypoxylon s. s. Interestingly the facets are fairly uniform in size in most (all?) species of the subgenus Trypargilum of Trypoxylon. The antennal sockets are contiguous with the clypeus in one of the species of Pison from New Guinea, and slightly above the frontoclypeal suture in the other. The sockets are far above the clypeus in Pisoxylon and Trypoxylon except for some groups within the subgenus Trypargilum. Pison lobiferum Arnold from Madagascar (Arnold, 1945) has three submarginal cells and a clavate first abdominal segment but its wing venation is quite different, and it apparently lacks a dorsolateral propodeal ridge. Thus a close relationship to the two New Guinea wasps seems unlikely.

### SUBGENERA

Four subgenera were recognized by Bohart and Menke (1976): Pison s.s., Pisonoides, Krombeiniellum and Entomopison. I now believe that subgenera are unwarranted as discussed below.



Pisonoides was proposed (Smith, 1858) for Pison obliteratum, an Indonesian species with two submarginal cells and a clavate first abdominal segment, but Turner (1916) used it for all species of Pison with two submarginal cells although he was aware that it was not a monophyletic subgenus. Two-celled wings have arisen independently a number of times in unrelated species or groups of Pison, and I (Menke, 1968a) restricted Pisonoides to three species with a clavate abdomen and two submarginal cells (obliteratum, difficile Turner and icarioides Turner). Lomholdt (1985:15) treated Pisonoides as a genus and further refined its definition by including only species (unspecified) with a "constriction" between abdominal segments I and II. Lomholdt (1985:4) listed Pisonoides exclusum Turner as the species he studied but Turner (1916) described its first abdominal segment as not elongate. I have studied obliteratum and difficile, and based on their overall morphology they have convergently developed two-celled wings and an elongate gaster and are not closely related. Thus there is no reason to maintain Pisonoides and I am synonymizing it under Pison. Pison difficile is of interest in that it is one of the very few species of the genus with a noncarinate hindcoxa (see p. 17).

Krombeiniellum has been used for species in which the eyes are densely microsetose (fig. 9), and was originally used for taxa with only two submarginal cells. I (Menke, 1968b) expanded the subgeneric concept to include species with setose eyes and three submarginal cells. My review of the neotropical fauna of Pison has shown that the three-celled species are not closely allied to the two-celled forms and that there are two disparate groups of species with two-celled forewings (agile and stangei groups). Furthermore, Pison delicatum, a new species with asetose eyes and three submarginal cells, shares several features with the agile, stangei and krombeini groups: a short, clavate antenna; nonspiny legs (fig. 72); a velvety covering of short body setae; and thick tarsal claws (fig. 70). If Krombeiniellum is to be recognized as a subgenus, it must be redefined on the basis of these latter features, some of which are apomorphies. I am not certain, however, that this would result in a monophyletic taxon and am simply synonymizing the subgenus with Pison.

Two neotropical species groups of Pison, the convexifrons and pilosum groups, are unusual in that the mandible has a notch on the posterior surface (figs. 5-6). I (Menke, 1968a) established the subgenus Entomopison for these species. This taxon has two apomorphies: the notched mandible and the polished, asetose "bearing" surface on the anterior margin of the pronotum (figs. 288, 295). The mandibular notch was thought to be unique to these New World species until Wojciech Pulawski returned from New Guinea in 1987 with a Pison (CAS), probably undescribed, that has a small notch. Actually the notch in this wasp is more like a "step" (fig. 4) that is delimited basad by a tooth-like angle. A similar but smaller step is present on the mandible of the Australasian and western Pacific island inhabitant, Pison ignavum Turner. Neither of these species have a broad pronotal bearing surface. In the two New World species groups this pronotal structure takes on two very different forms: a mediodorsal expansion of the polished rim that is not free (fig. 288, convexifrons group), and a broad lamella that is free from the rest of the notum (fig. 295, pilosum group). The two types represent convergent specializations in my opinion. Similar lamelliform structures are found in two other neotropical groups of Pison, the fritzi and krombeini groups, but in these the surface is setose, at least in part, and not always highly polished (fig. 45). Based on the foregoing, the convexifrons and pilosum groups probably represent two unrelated monophyletic lineages and I have decided to synonymize Entomopison under Pison.

Finally, Antropov and Pulawski (in prep.) are describing a fossil species of Pison from Baltic amber that has a notched mandible similar to that found in the convexifrons and pilosum groups. I have examined the unique specimen, and it appears to have an elongate anterodorsal pronotal pit that is bordered anterad by an overhanging lamelliform carina. It is impossible to determine if there is a polished bearing surface as in the convexifrons group, but there is no free lamella like that found in the pilosum group. The labrum appears quadrangular and is not emarginate, and the occipital carina is incomplete ventrad, ending well before the hypostomal carina. In these respects the fossil is like the convexifrons group. The pitted



episternal sulcus is straight, ending ventrad before curving forward. The metapleural flange looks like it is somewhat lamelliform, and almost as broad as a hindocellus. Hindtarsomeres II-IV each have a plantula. The propodeal dorsum has ridges that extend from the base in an oblique fashion, and a median, longitudinal carina. The fossil differs from present day species of the convexifrons and pilosum groups in at least two ways: the propodeal side is not delimited above by a crenulate ridge or line of foveae, and the second recurrent vein terminates on the third submarginal cell. Clearly the fossil represents a third lineage with a notched mandible.

### SPECIES GROUPS

The 44 New World species segregate into 12 groups, all but one of which (the conforme group) are defined by clear apomorphic features. Most of these groups appear to be endemic to the New World, but the agile group is an Old World assemblage with an introduced species in North America. The chilense group may have relatives in Australia.

Some of the characters useful in defining groups include: form of the mandible (position of teeth, presence of notch); shape and details of clypeal lobe; shape of labrum; form of the occipital carina; whether or not the frons is strongly swollen; proportions of head (eye length vs. distance between eye notches); presence or absence of dense setae on eye; presence or absence of an anterodorsal lamella or boss on the pronotum; presence or absence of a crenulate ridge at the top of the propodeal side; sculpture of propleuron; form of the episternal sulcus; wing venation; and form of male sternum VIII and genitalia.

The presence on the eye of short, dense setae is an apomorphic trait common in several groups (fig. 9), but some species of Pison have a few short setae widely scattered over the eye (cressoni group for example). In general a naked eye is the common condition.

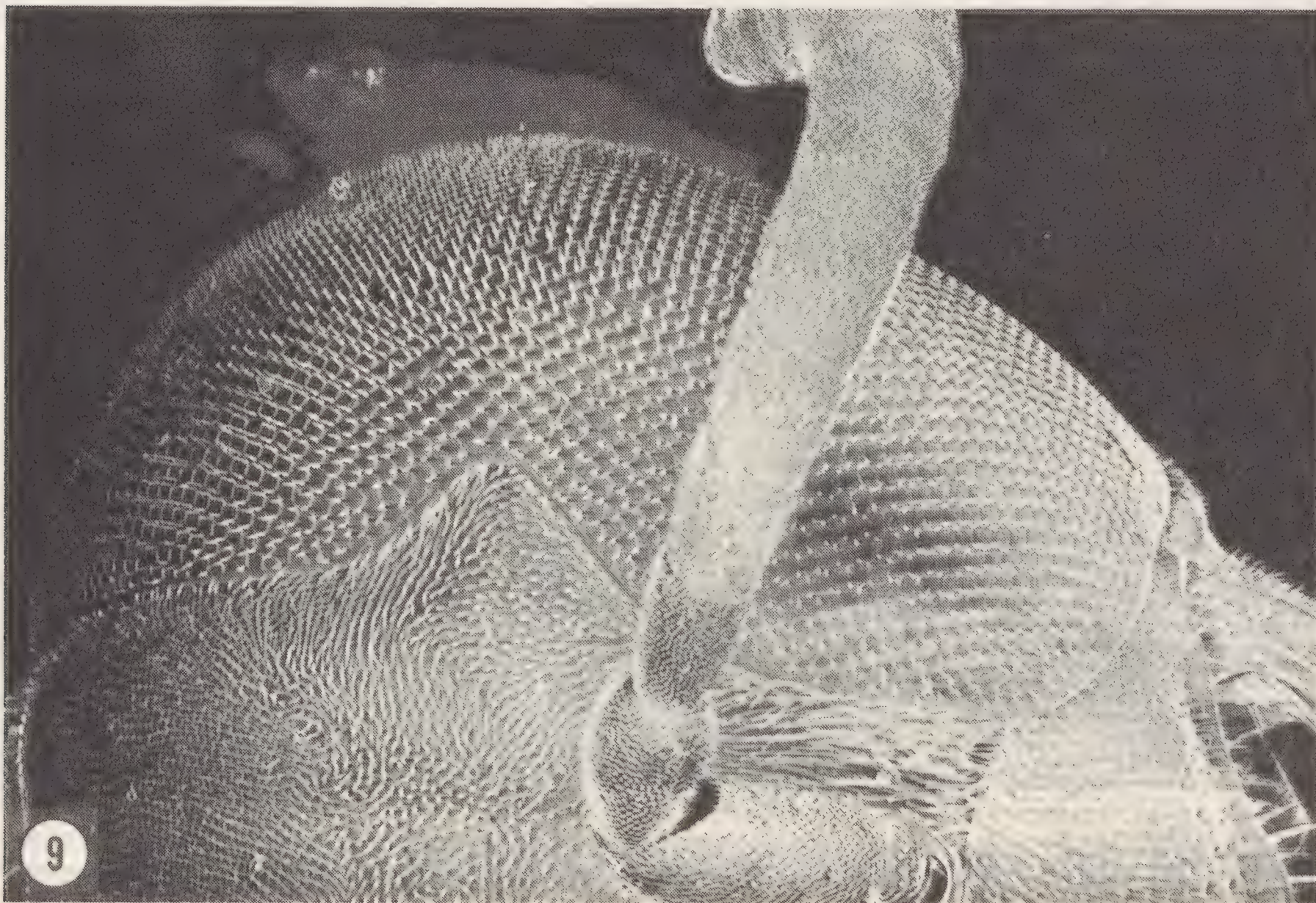


Figure 9. Left eye of Pison plaumanni showing eye setation.



The form of male sternum VIII is fairly uniform within a species group. It may be simply truncate or rounded apically (fig. 17), the plesiomorphic state, or the apex may be emarginate (fig. 238). The emargination is often bounded laterally by a blunt prong, or pseudosting (fig. 254).

The makeup of the male genitalia varies among the 12 species groups, some being robust, some laterally compressed, and some more or less dorsoventrally compressed. The gonostyle is a simple structure in the conforme, fritzi, eremnon, delicatum, agile, and euryps groups. In the pilosum group the gonostyle is often a simplified, large plate-like affair. The gonostyle has a ventral lobe in the krombeini, cressoni, and convexifrons groups, and there are two ventral lobes in the chilense group. I regard the presence of one or two gonostylar lobes as an apomorphy. The volsellar lobes are very large in the conforme, fritzi, eremnon, krombeini, and cressoni groups, but are quite small in the agile, stangei, convexifrons and pilosum groups. In the eremnon group, the volsellar lobes are represented by two long, narrow structures.

Descriptions and discussions of apomorphies are provided for most of the species groups. Descriptions have not been given for the two monotypic groups (eremnon and delicatum), but their species descriptions and discussions are adequate.

### SPECIES CHARACTERS

Described here are features used in species descriptions and group diagnoses that need clarification or merit discussion. Morphological terms are from Bohart and Menke (1976) except that for surface sculpture I have used the terminology developed by Harris (1979). I have used the terms "carina" and "ridge" more or less interchangeably. A lamelliform carina is one that is elevated into a thin blade-like structure.

Structures that have not been studied carefully for use in species discrimination are mouthparts, proportions and details of leg segments especially the tarsi, and details of wing venation such as proportions of cells and cell veinlets and the form of individual veins and cells. Apparent differences in the form of the propodeum (length, angle between dorsum and hindface, etc.) have been noted in some species but these are difficult to quantify and have usually been ignored.

Labrum: Sometimes the labrum is short, broad and is described as "transverse". Most often the labrum is "quadrangular", i.e., more or less truncate apically with perpendicular sides. It is deeply emarginate in the euryps and pilosum groups with the result that usually only two finger-like lobes are visible beneath the clypeal margin.

Clypeus: The clypeus is one of the more important structures for species discrimination. The free edge often has an impunctate, asetose rim or "lip", and usually projects as a median lobe whose shape varies from triangular to truncate or rounded. The lobe may bear several "teeth". When viewed from below, the free edge of the clypeus is often clearly "thickened" or "double-edged". In the latter instance the thickening is margined behind by a carina. Often the thickest part is the section between the median lobe and the lateral end point of the clypeal margin. The clypeal surface is often covered by metallic silver setae that are appressed and obscure the surface sculpture. Mixed with these short setae are longer setae that are directed downward, and in some cases they are quite bristly and form a "brush" that surpasses the edge of the clypeus (fig. 6).

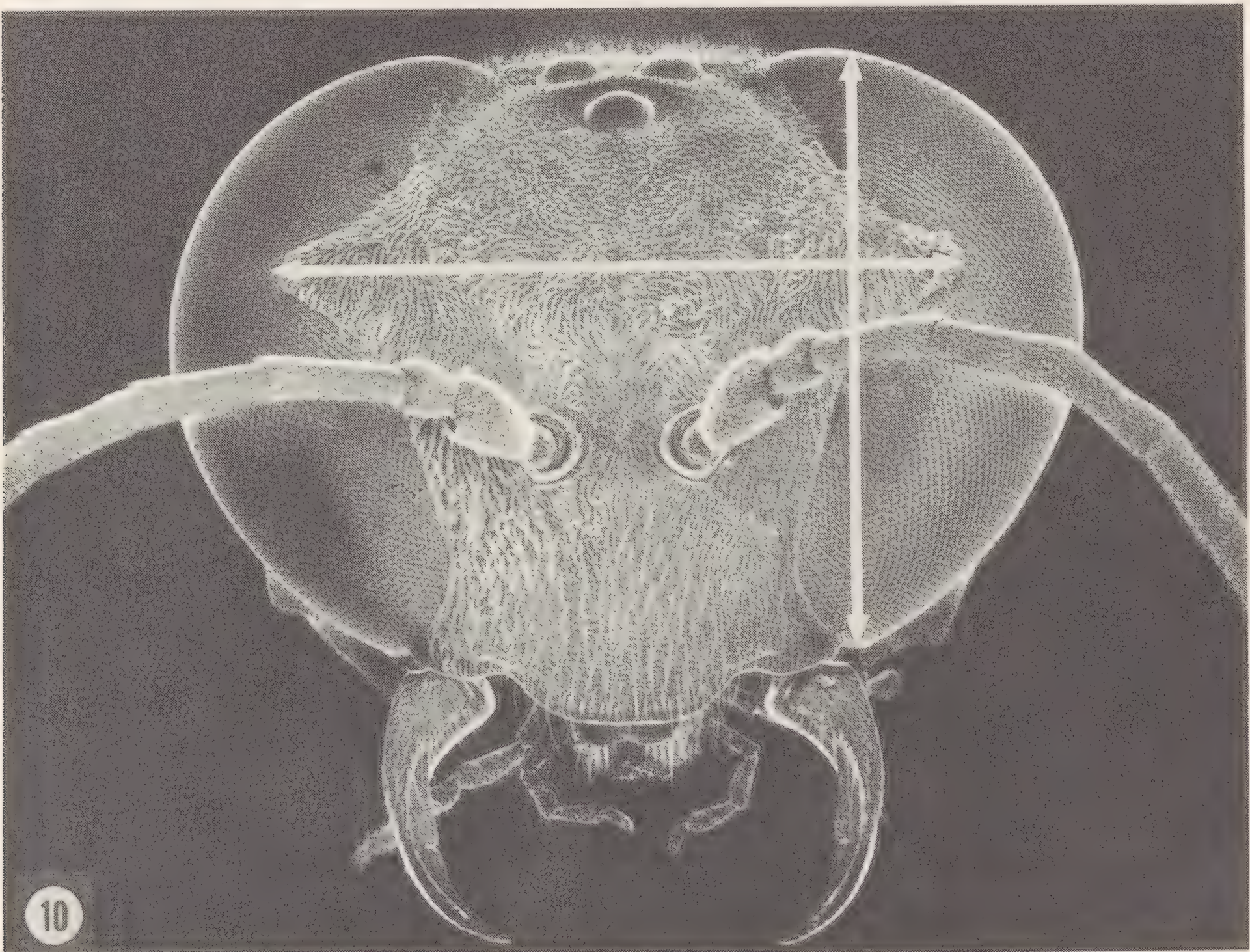
Frons: The common appearance is a gently convex surface, but in the convexifrons group the frons is strongly swollen toward the antennal sockets. In the pilosum group some species have a small, impunctate polished depression or "dimple" on the midline above the sockets. This feature is large in gnythos, new species.

Antenna: The antenna varies from moniliform with elongate flagellomeres (two or more times as long as wide) to clavate where the flagellomeres are progressively



shorter and broader toward the apex. Measurements of length and width of flagellomeres were made with an ocular micrometer at a magnification of 50X. Width measurements were always taken at the apex of an article, and the microsetae on the surface were not included. The male antenna sometimes has tyli or other modifications on some of the flagellomeres. When present, tyli occur on the surface that is on the inside of the antennal curl, and great care must be used in examining the flagellum for the presence of these and other specialized structures. Good light and high magnification (50X) are essential, and often the antenna has to be relaxed and uncurled in order to see the surface bearing these structures. A "simple" antenna is one in which the flagellum has no visible modifications.

Head measurements: The "upper interocular distance", or UID, is the shortest distance between the eyes at the vertex – it is always measured behind the ocellar triangle. The "lower interocular distance", or LID, is the shortest distance between the eyes adjacent to the clypeus (or near level of antennal sockets in some extralimital species). Eye length is measured vertically and is compared with the distance between the eye notches on the inner orbits (fig. 10). The "ocellocular distance", or OOD, is the measurement made between the inner orbit of the eye and the hindocellus. This is compared to the "hindocellus diameter", or HOD. All of these measurements were made with an ocular micrometer at a magnification of 50X to maximize accuracy.



10

Figure 10. Face of Pison eu, female, showing how to measure eye length and distance between eye notches.



Occipital carina: This is usually "incomplete", i.e., it does not form a complete circle. The lower ends of the carina either terminate just before the midline of the head, or just before meeting the hypostomal carina, or sometimes actually meet the hypostomal carina.

Pronotal pit and lamella: Because the anterior portion of the pronotum is usually hidden under the rear of the head, its structure has not been studied, at least in the Sphecidae. But in *Pison* I discovered two types of features that merit the attention of anyone working on the family. One character is the development in some taxa of the narrow polished anterior rim into either a broad boss or a broad, free lamella. The second is the presence of a round pit or transversely lengthened depression behind the anterior margin of the pronotum. Both features can only be viewed adequately when the head is tilted forward.

The normally narrow polished rim of the pronotum is occasionally broadened dorsally into a polished boss (*convexifrons* group, fig. 288) that is suggestive of a bearing surface for the back of the head (this may not be its true function). The more usual modification however, is the extension of the polished rim upward and backward as a broad, free lamella. In the *pilosum* group it extends laterad to about the level of the pronotal lobe (figs. 294-295), and the area directly beneath it is smooth and polished. Sometimes this lamella is present laterally but narrows toward midline where it is paralleled posteriorly by a lamelliform, setose carina that borders the anterodorsal pronotal depression (fig. 45, *fritzi* n. sp.). The lamella may be asetose and polished (*pilosum* and *fritzi* groups) or minutely setose (*krombeini* group).

The "anterodorsal pit of the pronotum" varies from a small round pit whose diameter is less than that of a hindocellus (fig. 95), to a "transversely elongate depression" (fig. 67) that may or may not be bordered anteriorly by a sharp edge or carina, the latter sometimes lamelliform, dull, and setose (*delicatum*, *fritzi*, n. spp.). When lamelliform this carina can be confused with the anterodorsal lamella described above, but the latter is usually polished and often asetose. When the pit is transformed into an elongate depression its surface is impunctate and shiny. When I refer to its "length" in descriptions and discussions, I mean its transverse length, i.e., perpendicular to the longitudinal axis of the body.

Pronotal collar: This is a fairly simple structure in most species, but it may be thick or thin and comparison to the width of the metanotum is usually made. Occasionally the "humerus", or lateral corner of the collar, is angular, the angle being part of a transversely oriented ridge (fig. 99). In some species the collar has a median prominence (fig. 288), or the anterior face may be flattened at the middle.

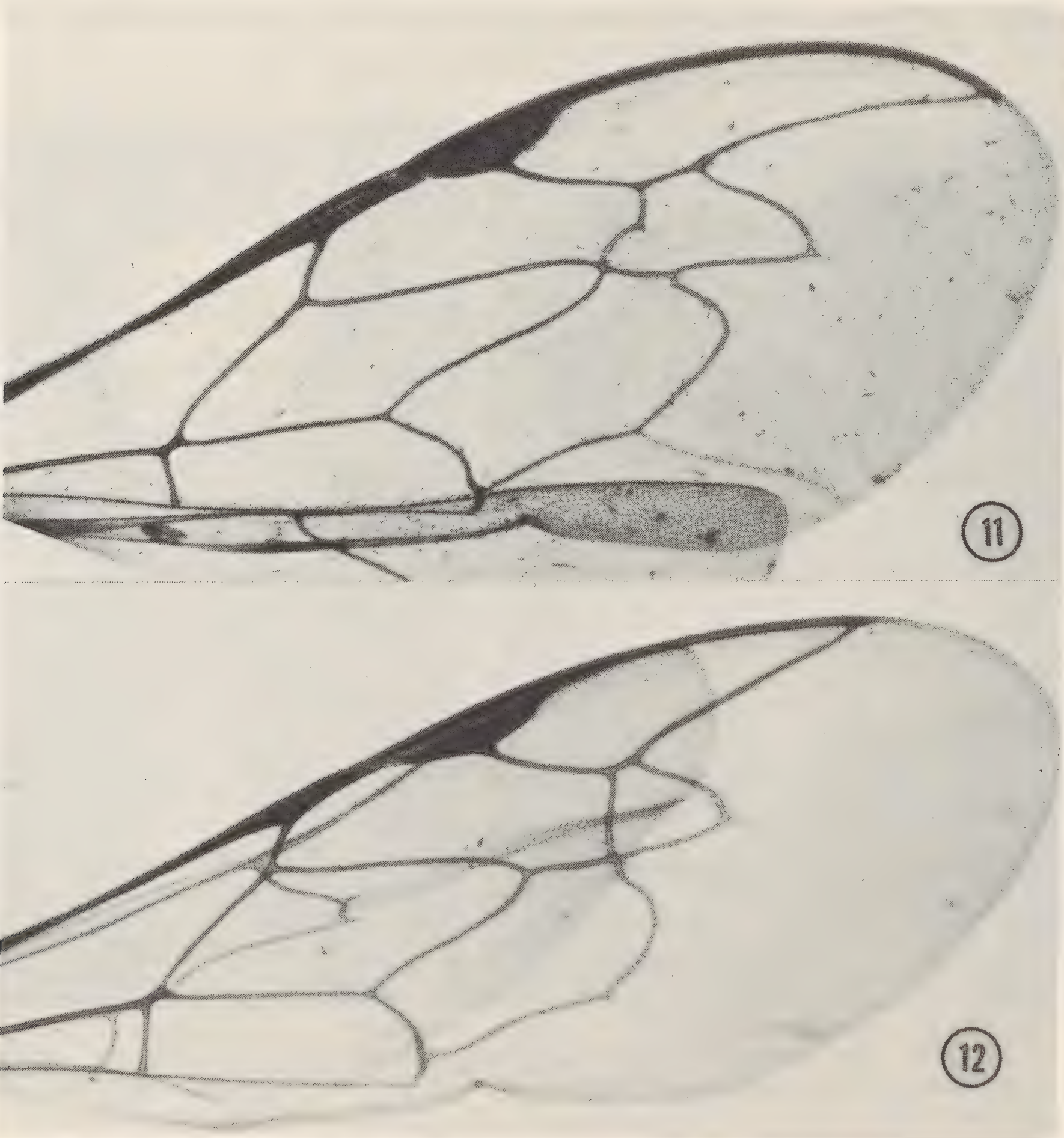
Scutal flange: The lateral edge of the scutum adjacent to the tegula is reflexed upward forming a flange of variable width.

Lateral ridge of propodeum: Some groups of *Pison* have a ridge that extends in a gradual arc from the spiracle to the propodeal socket (fig. 27). Since it is situated on the interface between the propodeal dorsum and side, it delimits the top of the latter. Usually associated with the dorsal side of this ridge are cross-carinae of variable length that are perpendicular to it. This usually makes the ridge appear crenulate. Sometimes the cross-carinae are reduced to very short teeth along the dorsal side of the ridge. In some species, the ridge is replaced by a row of large foveae as in the *pilosum* group. In a few species the ridge (*larsoni* n. sp.) or row of foveae (*pilosum* Smith) vary in development from present to non-existent.

Forewing: The marginal cell is typically acuminate distally. This is enhanced by the slight extension of vein R<sub>1</sub> beyond the end of the cell. In *eremnon* Menke the RS vein curves forward at the cell apex where it meets R<sub>1</sub> perpendicularly (fig. 53). A somewhat intermediate condition occurs in *chilense* (fig. 253). Although three submarginal cells is the norm in *Pison*, with the second petiolate, two-celled wings are characteristic of the *agile* and *stangei* groups (fig. 12), and are also found in a few species of other groups (fig. 11). This reduction in submarginal cells occurs two



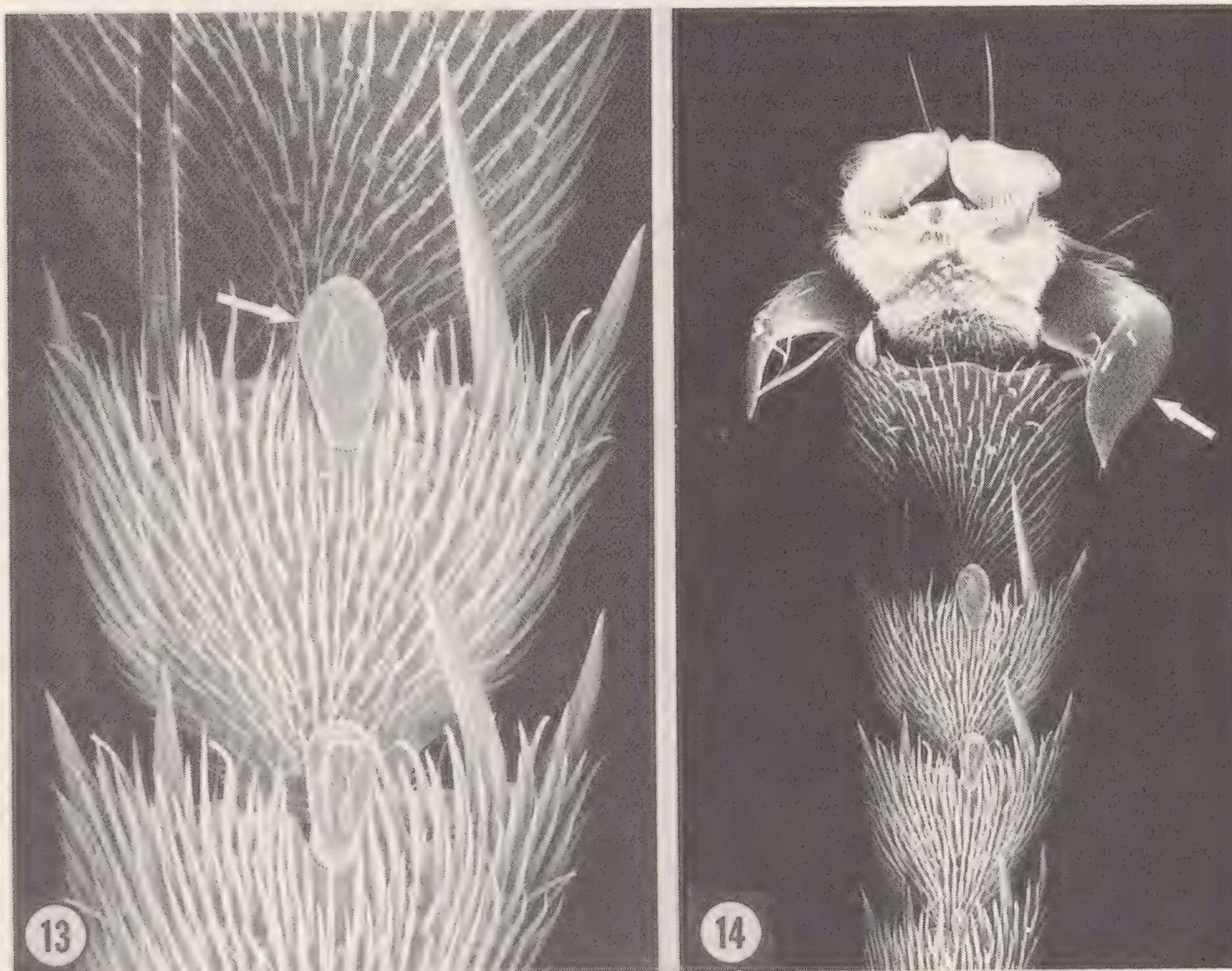
ways. Loss of the outer veinlet (lr-m) of the second submarginal cell results in the two-celled condition seen in some species of the cressoni and euryps groups. In these the remaining veinlet is usually angulate (fig. 11). Diminution (figs. 87-88) and eventual loss of the second submarginal cell is another way of achieving a two-celled wing (agile and stangei groups). Here the resulting veinlet between the remaining submarginal cells is more or less straight (fig. 12). The shape of submarginal cell III varies at the group level. The inner and outer veinlets (lr-m, 2r-m) may meet on the marginal cell or be well separated there. In rare instances the two veinlets join before reaching the marginal cell resulting in a petiolate third submarginal cell. The termination point of the recurrent veins (lm-cu and 2m-cu) varies considerably in Neotropical Pison, sometimes even within a species. The point of divergence of the forewing media in relation to crossvein cu-a is useful in some species. Typically the media diverges after cu-a, but occasionally it is before cu-a as in abothrum and brasilium.



Figures 11-12. Right forewing. 11, Pison styphopteron n. sp. (holotype). 12, Pison plaumanni Menke.



Legs: The hindcoxa has one or two longitudinal carinae dorsally. The inner one is always present and sometimes it is partially lamelliform. Apparent differences between species in the degree and shape of the lamelliform part of this carina seem unreliable, however. An outer carina is present in the convexifrons and pilosum groups, but in most Pison it is usually present only on the apical one half, or less. It is absent in a few species. The male foretrochanter is usually simple, but it has a sharp spine in some species of the pilosum group (figs. 292-293). A plantula occurs at the ventral apex of tarsomeres II-IV in some species (figs. 13-14, fritzi and pilosum groups, chilense, eremnon), but usually only tarsomere IV has one, and they appear to be absent in the krombeini and stangei groups and in a few other species. Usually the legs have some conspicuous spines at the apex of the tarsomeres, but in the krombeini, agile, stangei and delicatum groups the legs are essentially unarmed (fig. 72). The claw is unusual in these latter forms also. Instead of gradually tapering to the apex, the claw is of fairly uniform width until just before the apex (fig. 70). The claws in males of the pilosum group are asymmetrical on the foreleg, and sometimes on the middle leg. In this group the anterior claw is deformed and lamelliform (fig. 14).



Figures 13-14. Details of male foretarsus of Pison pilosum. 13, ventral view of tarsomeres III-IV showing plantulae. 14, ventral view of tarsomeres III-V showing deformed claw.



Gaster: This is the definitive abdomen and the segments are numbered I–VI or VII depending on sex. Segment I is somewhat elongate in a few species and I have expressed this by measuring the length of tergum I along its midlength in dorsal view, and comparing that to the apical width. This is somewhat imprecise because the midlength can vary depending on how the segment is oriented. The first two or three terga are sometimes rather strongly convex with result that in lateral profile there is a strong constriction between terga I and II (pilosum group, fig. 301). In a few species of the cressoni group, especially in the female, tergum II has a median hump (figs. 162, 251). More commonly tergum II may have a pair of low swellings, one on each side of the midline, as in the pilosum group, eremnon, and others. The apical margin of tergum I is sometimes double-edged (euryps and pilosum groups, fig. 335), or it may be depressed subapically forming an apical band (eremnon), or the edge may be reflexed as in the krombeini group. Some species have tergal fasciae of setae (chilense group for example) or yellow bands (cressoni group). Male tergum VII is generally simple, but it is laterally compressed in some species of the convexifrons group, truncate apically in the chilense group, and ends in two rounded, reflexed lobes in eremnon. Tergum VI in eremnon is deeply V-notched apically (fig. 56). Although the sterna are sometimes modified in the females (slight median hump on sternum II in conforme, for example), specializations on the venter occur mainly in males and are presumed to have a role in copulation. The male of eremnon, which has the most sternal embellishments among New World Pison, has transverse flanges on sterna II–III, setal depressions on IV–VI, and sterna VI–VII are emarginate apically (figs. 58–59). The male of delicatum has decumbent mats of setae on sterna III–V (fig. 68). Sternum VII sometimes has depressions of various shapes as in the pilosum group (figs. 304–306). Sternum VIII may be truncate apically (fig. 108), rounded apically (fig. 18), emarginate apically (fig. 69), or end in two strong prongs (fig. 254).

Male genitalia: These structures usually offer good specific differences in New World Pison and I have used scanning electron photomicrographs to illustrate them. The ventral side of the genitalia offers the most diagnostic features, particularly the structure of the gonostyle. The volsella in New World Pison is usually represented by a pair of lobes associated with the inner margin of the gonostyle. They are often quite large as in the cressoni group (fig. 145), but in the pilosum group the volsellar lobes are much reduced (fig. 308) and sometimes scarcely defined. See species group discussions for further details.

## CHARACTER ANALYSIS

Discussions of characters and their polarity in the subfamily Larrinae were given by Bohart and Menke (1976) and Lomholdt (1985). Lomholdt presented a cladistic analysis and a reclassification of the Larrinae. The following review of characters is largely restricted to those features that are of significance in Pison and not polarized by Bohart and Menke (1976:224). In my attempts at polarizing characters I have studied examples of most genera in all subfamilies of the Sphecidae, but I have examined as many species of each genus in the Trypoxylini as possible. I have also reviewed Brothers' (1975) important paper on aculeate phylogeny, as well as Carpenter (1981) on the Vespidae. Determining polarity has sometimes been problematical and developing a hypothesis of mandibular notch polarity has been especially unsatisfying. What is really needed is a thorough morphological study of the mandible throughout the Sphecidae similar to the one done on bees by Michener and Fraser (1978) in which all grooves, ridges, setal rows, etc. are analyzed and homologies developed.

The plesiomorphic state for each character is listed first.

Mandibular notch: 1. absent. 2. present.

There can be scarcely any doubt that the notched mandible is an apomorphy within the Sphecidae as a whole, but how to interpret it within the subfamily Larrinae, where it is a common feature, is a problem. Lomholdt (1985:19, 21)



regarded a notchless mandible as the plesiomorphic condition in the Larrinae sensu lato, within which he incorporated the Crabroninae (Oxybelini and Crabronini). He stated that notchless mandibles occur in "a very few larrine genera", but unfortunately he did not list them. Bohart and Menke (1976:225) declined to polarize the presence of a mandibular notch, but suggested that the notch could be the plesiomorphic state. The notch is universal, or nearly so, in the majority of the 39 genera in the Larrinae sensu stricto (Crabroninae excluded), and is absent primarily in genera that are fairly specialized (Nitela, Auchenophorus, Aulacophilus, Aulacophilinus, Pisoxylon, Trypoxylon, Sanaviron, Bohartella, Dalara and Paraliris). Lomholdt (1985:19, 45) considered the simple mandible in Nitela and Auchenophorus to be a reversal from the apomorphic notched state, and presumably that was his interpretation of the presence of simple mandibles in the 30 or so genera of the Crabronini.

Regardless of the polarization adopted, homoplasy is involved, and support for either hypothesis can only be obtained by a thorough phylogenetic analysis of all genera in the Larrinae and Crabroninae. In lieu of such an analysis I am adopting the most parsimonious hypothesis of mandibular notch polarity, one that minimizes reversals. Thus I regard a notchless mandible as the plesiomorphic state in Larrinae. I also hypothesize that highly evolved genera like Nitela, Auchenophorus, Trypoxylon, and Bohartella have retained a primitive mandible (instead of a reversal as espoused by Lomholdt). Reversals may have occurred from the apomorphic notched condition in genera like Liris, Holotachysphex and Tachytes (Larrini) where a few species have simple mandibles. Notchless mandibles also occur sporadically in a few species of some other genera in the Larrinae s. s., and most species of Solierella (Miscophini) have simple mandibles. Bohart and Menke (1976:292) and Lomholdt (1985:165) believed the notchless mandible in Solierella to be a reversal, but it seems more parsimonious to regard the genus as having retained the plesiomorphic notchless mandible in the majority of its species, especially since it is regarded as one of the least specialized genera in the Miscophini by these three authors.

A mandibular notch is not unique to the Larrinae s.s. The condition occurs in eight of the approximately 45 genera of the Crabroninae and also in three small unrelated genera: Dinetus (Astatinae), Laphyragogus (Laphyragoginae), and Xenosphex (Xenosphēcinae). Several important apomorphies are shared by the Larrinae and Crabroninae (single midtibial spur, simple volsella, and larvae with preapical anus\*), but Bohart and Menke (1976:30, 222) did not combine them into one subfamily. Lomholdt (1985), however, has taken this step and I am in accord. The mandibular notch is an additional derived feature of the Larrinae and Crabroninae which, although not present in all genera, suggests that it is logical to place the crabronine tribes Oxybelini and Crabronini within a restructured Larrinae. Four of the five genera of Oxybelini have notched mandibles although the state is not universal in all of them. Only four genera of Crabronini have notched mandibles and they were regarded by Bohart and Menke (1976) as among the most primitive in the tribe, a judgement that is probably erroneous due to the presence of various apomorphic states, one, of course, being the mandibular notch. I hypothesize that most genera in the Crabronini have retained the plesiomorphic notchless mandible although a few reversals may have occurred.

The function of the notch is unknown although Lomholdt (1985:19) declared that it and "the row of stiff bristles presumably serve to clean and protect the opposite

\* Lomholdt (1985:21) regards the absence of larval papillae as an additional apomorphy, but Evans (1964) treated this state as the plesiomorphic condition in Sphecidae. Lomholdt's idea only requires reduction of the papilla along several different phyletic lines, but Evans' polarity requires reversals as discussed by him (Evans, 1964:232-233): reduction of the antennal papilla and then redevelopment of long papillae "by at least two stocks of Sphecidae". In bees Michener (1953) regarded the absence of papillae as an apomorphy. More study of this character seems appropriate. Lomholdt also introduced a new apomorphy for the Larrinae, the presence of a "genal tentorial arm", but he added that "the significance of this character can be evaluated better after studying more sphecid genera". He also used a carinate hindcoxa as a synapomorphy for the Larrinae but see my discussion on page 17.



mandible". How a mandibular notch can clean any part of the opposite mandible escapes me, and it is more likely that the "bristles" are used in digging, i.e., part of the psammophore. It is conceivable that the notch might be used in cleaning an antenna or part of a leg, but no one has described such activity to my knowledge. The notch is common in fossorial genera and it may have some function in nest building, although the fact that some fossorial genera in the Crabronini have notchless mandibles confounds this idea. The absence of a mandibular notch sometimes coincides with a xylicolous or mud nest building lifestyle as in Trypoxylon. Some Pison are ground nesters (chilense, several Australian species – see Evans, 1981) and they have notchless mandibles. Members of the convexifrons and pilosum groups of Pison are nonfossorial so far as known, and all of them have notched mandibles. The small genus Holotachysphex is also perplexing; five of its six species have notchless mandibles, but the one with notched mandibles and the only species whose biology is known, turneri (Arnold), is a twig nester (Gess, 1978). In the final analysis, there is no strong evidence for associating the mandibular notch with fossorial or nonfossorial habits.

Labrum: 1. quadrangular, free margin entire. 2. bilobed.

The labrum is a fairly simple structure in Pisonopsis, Aulacophilus and many species of Pison, but the apex is variably emarginate in some Pison and Trypoxylon. The extreme elaboration of the emargination results in a labrum that has two long, finger-like lobes (Pisoxylon, some Pison, some Trypoxylon), an obvious apomorphy.

Anterior polished rim of pronotum: 1. narrow. 2. broadened.

Generally the anterior rim of the pronotum in the Sphecidae is narrowly polished, presumably as a bearing surface for the back of the head. This is the plesiomorphic condition. This rim is sometimes elaborated into a mediodorsal triangle as in Prionyx (Sphecinae), or a broad dorsal boss as in some Pison. Sometimes the rim is broadened over much of its length as in Ampulex (Ampulicinae), Polemistus and Arpactophilus (Pemphredoninae), Psammaletes and Ammatomus (Gorytini), Paranysson and especially Mesopalarus (Miscophini), or it may be broadened laterally as in Vechtia (Crabronini). These various elaborations are obvious apomorphies.

Anterodorsal lamella of pronotum: 1. absent. 2. present.

In some Pison the narrow polished rim is elaborated into a broad, free lamella, an obvious apomorphy. Within the Trypoxylini this lamella is not unique to Pison. It occurs in Aulacophilus and some Trypoxylon (rugifrons for example). In a cursory survey of the other sphecid groups I have found a similar structure in the Sphecinae (Trigonopsis, Podium), the Pemphredonini (Pemphredon, Stigmus), the Scapheutini (Scapheutes, Bohartella), the Crabronini (Entomocrabro, Quexua, Chimila) and the Gorytini (Sagenista, Pseudoplisus oraclensis). A similar but possibly not homologous lamelliform structure occurs in some Pison and elsewhere in the Sphecidae (Neodasyproctus, Dasyproctus and Ectemnius of the Crabronini for example). The anterodorsal pronotal pit or transverse depression is often delimited cephalad by a carina which, in some taxa, is elaborated into a lamella that resembles the polished anterodorsal lamella, but it is dull, setose and has at its base the normal, narrow polished, pronotal rim. The presence of the latter suggests that this type of lamella is not homologous with the polished lamelliform extension of the pronotal rim. In any event, both forms of lamellae are obvious apomorphies.

Anterodorsal pit of pronotum: 1. absent 2. present.

The anterior part of the pronotum of many sphecids has a pit, a pair of pits, a series of pits, or a transverse depression that may be sulciform. These are believed to be homologous but some of the linear depressions have a more anterior location and may represent independent developments. Pronotal depressions are absent in most Ampulicinae, Laphyragoginae, Nyssoninae, Philanthinae, Entomosericinae and Xenosphecinae, and this is the common state in Pompilidae and many Vespidae s.l. based on my cursory survey of those two groups. On this evidence a plain pronotum is the plesiomorphic condition in Sphecidae (Carpenter and Cumming, 1985, regarded



similar pronotal pits or "foveae" as apomorphic in Eumeninae). I regard the single, round, median pit seen in some Pison as the simplest apomorphic state. Often the pit is transversely elongate and one or both margins may be cariniform, and this represents further specialization. The channel-like or sulciform depression seen in some sphecids (most Sphecinae, Astatinae, some Pemphredonini, Scapheutini, some Crabronini, some Trypoxylini) may be a further extension of this trend, or else a completely independent specialization. In genera having species with a pronotal lamella, a polished linear depression is sometimes closely associated and it is likewise possibly a completely independent development instead of a highly derived pit. Its location is more forward than the normal location of the pit.

I have made a cursory examination of the pronotum throughout the Sphecidae and present my findings below. In the Trypoxylini I have examined many species of each genus, but only one or two species of each genus in other sphecid groups. My survey of the genera in the Pemphredoninae and Nyssoninae has been even less thorough. Thus the following discussion is preliminary, but it does give some indication of the variation of a new character complex.

In the Trypoxylini only Pisonopsis, Aulacophilus, and Pison have depressions (I have not seen material of Aulacophilinus Lomholdt, 1980). I examined a cross section of species in Trypoxylon (including Trypargilum) and the pronotum always lacks a pit or transverse depression. The same is true of Pisoxylon. Although most species of Pison have a pronotal pit or transverse depression, the plesiomorphic pitless condition is occasionally seen (obliteratum, xanthopus, multistrigatum and kohlii in the Old World; species of the euryps, krombeini and pilosum groups in the New World).

In the Miscophini the pronotum is pitless in Nitela, Auchenophorus, Mesopalarus, some Solierella, some Plenoculus, some Miscophus, some Saliostethus and in Nanomiscophus. Lyroda is unique in having a linear series of large, deep pits that closely parallel the polished rim of the pronotum – an autapomorphy for the genus. The forward location of these pits may mean that they are not a homologue of the pronotal pit. I suspect they are not. Other genera in the Miscophini have a transversely elongate pronotal pit (Plenoculus, Sphodrotes, Larissen, Paranysson, Aha and some Solierella and Miscophus). Some Saliostethus have two pits. I have not examined Sericophorus or some of the endemic African genera. In the Oxybelini and Crabronini the pronotum may be pitless, or more commonly have a transverse depression that is sometimes vaguely defined. In some genera there are two discrete pits (Enoplolindenius, Foxita, Arnoldita, Chimiloides, Lestica, for example). Anacrabro and Encopognathus have a deep, transverse groove. In the Bothynostethini the pronotum is plain in all species of Bothynostethus examined, and Willinikiella argentina (Schrottky) only has a vague pronotal depression. I have not examined Sanaviron (Vardy, 1987). Most genera in the Larrini seem to have a pair of elongate pits or a single elongate pit that may be weakly impressed. Some species of Tachysphex have a small circular pit. In Palarus (Palarini) the pronotum has a pair of transversely elongate grooves that are narrowly separated at the midline by a bridge. In some species there is a transverse groove behind these two depressions that is similar to the condition found in some nyssonine wasps (see below).

In the Pemphredoninae the pronotum displays a variety of states. The Psenini that were examined have a transverse impression at the base of the collar, but it is often vague, and it is not clear if this is homologous with the pronotal pit. In the Pemphredonini the pronotum may be pitless (Diodontus, Polemistus), have a transverse channel that may be deep (Pemphredon, Stigmus) or shallow (Carinostigmus), or a pair of shallow pits (Spilomena, Ammoplanops, Pulverro). The front margin of the pronotum is deeply emarginate at the middle in the last two genera, a feature that may have taxonomic importance.

Although most nyssonine taxa seem to have a plain pronotum, Heliocausus (including Tiquipa and Acanthocausus – Heliocausini) has a transverse depression at the base of the collar. Similar depressions occur in the gorytin genera Sphecius, Handlirschia and Kohlia; the depression is broadly oval and deep in the last genus. Stizus and Stizoides (Stizini) and some genera in the Bembecini (Hemidula, Stictia, Rubrica, Zyzyx, and Trichostictia) have a deep pit also, and a thin, sulciform depression often extends laterad from the area. The nyssonine "pit", by virtue of its



location at the base of the collar, may not be homologous with the pronotal depressions found in other sphecids subfamilies.

Although a pitless pronotum is regarded as plesiomorphic here, it seems likely to me that reversals have occurred in some sphecids genera.

Lateral ridge of propodeum: 1. absent. 2. present.

This ridge is a common feature in many genera of the Oxybelini, Crabronini, and Trypoxylini but is infrequent elsewhere in the Larrinae, and the rest of the Sphecidae for that matter. Within the Trypoxylini it is prevalent in Pison and Trypoxylon but not universal in either. Because the Oxybelini and Crabronini are generally regarded as among the most highly evolved larrines, and because the ridge is restricted primarily to the Larrinae, I am considering the presence of this ridge to be an apomorphy. I suspect that reversals may have occurred in Trypoxylon, Pison, and perhaps in other genera, but further study is needed to be sure.

Hindcoxal carinae: 1. absent. 2. inner carina present. 3. inner and outer carinae present.

Brothers (1975:524, 544) considers a noncarinate hindcoxal dorsum to be plesiomorphic in the Aculeata, and in the Sphecidae. Within the Sphecidae a noncarinate coxa is typical of some species of Ampulex (Ampulicinae), all genera in the Sphecinae, a few genera in the Pemphredoninae, all genera in the Astatinae, the Laphyragoginae, all Nyssoninae except Nyssonini, some Alyssonini and some Gorytini, and all Philanthinae except Pseudoscolia and some Cerceris.

According to Lomholdt (1985:20) the hindcoxa is carinate "in most larrine genera" and "a very similar structure is present in Dinetus" (Astatinae). But in fact the hindcoxa is noncarinate in all genera in the Larrini (rare exceptions), some species of Palarus (Palarini), some Trypoxylini (Pisoxylon, some species of the subgenus Trypargilum, and rarely in Pison), the genus Belomicroides (Oxybelini), approximately half of the genera in Crabronini, and some genera of Miscophini (some Lyroda, apparently all Plenoculus, a few Miscophus, apparently all Sphodrotes, many Paranysson, and all Aha). Finally, three species of Dinetus available to me, pictus (Fabricius), cereolus Morice, and psammophilus Kazenas, lack hindcoxal carinae.

When a carina is present it is typically found along the inner edge of the dorsum. Sometimes it is lamelliform and may be extruded into a tooth near the coxal base. In some sphecids, there are two carinae, an inner one and an outer one (Entomosericus, Bohartella, Enchemicrum, Oxybelus, Encopognathus, Entomognathus, Lindenius, some Palarus, some Larrisson, some Auchenophorus, some Pison, most Pisonopsis). The outer one is often restricted to the apical one-half of the coxa. In rare cases, the outer carina is the only one present (Belomicrus, Chimila, some Lestica for example). The hindcoxal carinae vary in form and length in different sphecids groups, and I suspect that these carinae have arisen independently a number of times; the possibility of a few reversals also needs to be examined. Carpenter (1981) regarded the hindcoxal carina as homoplasious in the Vespidae.

Lomholdt (1985:21) cites the carinate hindcoxa as one of five synapomorphies for the subfamily Larrinae, adding that "no such carina occurs elsewhere in the sphecids wasps". But this is incorrect. My cursory survey of the Sphecidae indicates coxal carinae occur in several other subfamilies. In the Ampulicinae apparently all members of the Dolichurini have a coxal carina and so do some species of Ampulex (Ampulicini). I have not surveyed the Pemphredoninae thoroughly but a carina is present in Ammopsen, Stigmus, Ammoplanops, Pulverro, and some Pemphredon. Apparently all genera in the Nyssonini and the gorytin genera Clitemnestra, Ochleroptera, Olqia and Argogorytes (some) have coxal carinae. A short carina is found in some species in the Alyssonini, and some species of the philanthine genera Cerceris and Pseudoscolia.

In summary, a hindcoxal carina is a common feature in the Larrinae, but it is not universally present nor is it unique to the group by any means. Thus, it cannot be a synapomorphy for the Larrinae.



Tarsal claws: 1. symmetrical, gradually attenuate to apex. 2. asymmetrical or suddenly attenuate near apex.

In Pison the claws of each leg are nearly always identical and typically they narrow gradually toward the apex. In the pilosum group, however, the anterior claw of the foreleg and sometimes the midleg is deformed in the male, an apomorphy. Another apparent apomorphy is the peculiar thick claw found in some species where attenuation to the apex occurs suddenly (delicatum, agile, stangei and krombeini groups).

Male sternum VIII: 1. apex not emarginate. 2. apex with semicircular or V-shaped emargination. 3. emargination bounded by a pair of blunt projections.

The emargination of sternum VIII results in the presence of a pseudosting that may be elaborated upon by the development of small projecting lobes. I consider these to be derived traits.

Gonostyle of male genitalia: 1. narrowly elongate distally. 2. with short distal lobe.

An elongate, setose gonostyle is the common condition in Larrinae, and most Pison, but in the pilosum group the gonostyle is often represented by a large plate that has at most a short apical setose lobe.

Gonostylar appendages: 1. none present. 2. one accessory lobe present ventrally. 3. two accessory lobes present ventrally.

A fairly simple gonostyle was considered by Bohart and Menke (1976) as the plesiomorphic state. A few New World species of Pison have elaborate gonostyli including one or two lobes ventrally.

Volsellar lobes: 1. large. 2. small

Reduction of the volsella in the Sphecidae is generally accepted as the apomorphic condition (Bohart and Menke, 1976; Lomholdt, 1985). Within the Larrinae the volsella is sometimes absent (Paranysson, Plenoculus, Solierella, Nitela - all in Miscophini) or reduced to a small setose area or lobe on the inner basoventral area of the gonostyle (Aha, Miscophus, Saliostethus, Saliostethoides, Miscophoides, Namiscophus - all Miscophini). The majority of larrine genera have a well defined volsella, however, and this is true for most species of New World Pison. But the volsellar lobes are much reduced in the pilosum group. The elongate volsellar lobes of the cressoni and eremnon groups may be elaborations, so that reversals can not be ruled out.

## BIOLOGY

Data are available for only 7 of the 44 species treated here and much of it is fragmentary so that no generalizations can be made. Nothing is known for 7 of the 12 species groups recognized. Pison chilense excavates burrows in the ground and cells are separated by mud partitions. The other species, agile, cressoni, aranevorax, longicorne, pilosum and sphaerophallus, make nests in sheltered situations such as bird nests, wasp nests, tents of lasiocampid moths, and the underside of leaves. These non-groundnesters make mud cells that are sometimes arranged in rows, sometimes randomly grouped. Spiders are provisioned. Chalcidoid parasitoids have been reared from the nests of some species. See individual accounts of the above species for further details.



KEY TO SPECIES OF NEW WORLD PISON\*

(unknown: males of abathes, duckei, erebus, eyvae,  
martini, nosferatu, neotropicum, pentafasciatum,  
and phthinylla, and females of lillo and oaxaca)

1. Mandible with posterobasal notch (figs. 5–6) ..... 2
- Mandible entire, without posterobasal notch (fig. 3) ..... 19
2. Females (six gastral segments) ..... 3
- Males (seven gastral segments) ..... 10
3. Anterior margin of pronotum with broad, non-lamelliform, polished area that is restricted to middorsum (fig. 288) ..... 4
- Anterior margin of pronotum with broad, polished, free lamella that extends laterad to level of pronotal lobe (figs. 294–295) ..... 7
4. Flagellomeres VII–IX nearly three times as long as wide; clypeal lobe as in fig. 285; propodeal hindface unridged (or largely so) .... longicorne Menke, p. 78
- Flagellomeres VII–IX about as long as wide; clypeal lobe as in fig. 270; propodeal hindface with transverse ridges ..... 5
5. Propodeal dorsum finely, transversely carinate or striatopunctate (fig. 268) ..... convexifrons Taschenberg, p. 75
- Propodeal dorsum smooth except for median carina (fig. 269) ..... 6
6. Mesopleural punctation sparser toward mesopleural sulcus (fig. 280); Amazon basin and northward ..... cooperi Menke, p. 77
- Mesopleural punctation uniformly dense to mesopleural sulcus (fig. 279); northwestern Argentina ..... wasbaueri Menke, p. 76
7. Gaster with obvious constriction between terga I–II in lateral profile (fig. 301), tergum I strongly humped ..... (pilosum complex) ..... 8
- Gaster without constriction, tergum I not humped ..... 9
8. Antenna completely black ..... pilosum Smith & vincenti Menke, p. 81, 84
- Flagellomeres I–II pale beneath; se Brasil, Paraguay .... aureofaciale Strand, p. 84
9. Propodeal dorsum with median carina and lateral line of foveae; clypeal lobe arcuate (fig. 324); frons with ocellar-sized polished depression (fig. 323) ..... gnythos Menke, p. 86
- Propodeal dorsum without median carina or lateral line of foveae (fig. 337); clypeal lobe triangular (fig. 333); frons without ocellar-sized polished depression above sockets ..... sphaerophallus Menke, p. 88
10. Foretrochanter with sharp spine on underside (figs. 292–293) ..... 11
- Foretrochanter without spine on underside ..... 14
11. Foretrochanter spine located near middle of segment (fig. 293); propodeal dorsum without median longitudinal carina; propodeum without crenulate groove laterally ..... sphaerophallus Menke, p. 88
- Foretrochanter spine located at apical third of segment (fig. 292); propodeal dorsum with median, longitudinal carina, at least basally; propodeum with crenulate groove laterally ..... (pilosum complex) ..... 12

\* Head measurements should be made at a magnification of at least 50X.



12. Sternum VII flat, without circular or oval depression at middle (fig. 303); anterior claw of midleg normal, not distorted ..... pilosum Smith, p. 81
- Sternum VII with circular or oval depression at middle (may be concealed under S VI) (figs. 304-306); anterior claw of midleg distorted ..... 13
13. Sternum VIII narrow and depression on VII circular (fig. 304); s. Brasil, Paraguay ..... aureofaciale Strand, p. 84
- Sternum VIII broad and depression on VII elongate (fig. 305); n. South America ..... vincenti Menke, p. 84
14. Sternum VIII rounded apically (figs. 306, 328) ..... 15
- Sternum VIII emarginate apically (fig. 278) ..... 16
15. Tergum VII compressed laterally, forming a median ridge; frons without ocellus-sized polished spot between sockets and midocellus; UID more than one-half LID ..... oaxaca Menke, p. 85
- Tergum VII without median ridge, apical margin reflexed; frons with polished ocellus-sized median spot between sockets and midocellus; UID less than one half LID ..... gnythos Menke, p. 86
16. Flagellomeres VIII-X almost twice as long as broad; propodeal hindface smooth or nearly so ..... longicorne Menke, p. 78
- Flagellomeres VIII-X about as long as broad, shorter and thicker than I-III; propodeal hindface with strong transverse ridging (figs. 268-269) ..... 17
17. Propodeal dorsum cross-carinate (fig. 268) ..... convexifrons Taschenberg, p. 75
- Propodeal dorsum largely smooth (fig. 269) ..... 18
18. Gonostyle of genitalia with long, curving spine ventrally (fig. 282); Bolivia, Brasil north to Costa Rica, Dominica ..... cooperi Menke, p. 77
- Gonostyle with short ventral spine (figs. 276-277); northern Argentina ..... wasbaueri Menke, p. 76
19. Eye covered densely with short setae (fig. 9) ..... 20
- Eye bare or with only few widely scattered setae ..... 26
20. Propodeal side without dorsal carina or ridge; forewing with two or three submarginal cells ..... 21
- Propodeal side delimited dorsad by carina or crenulate ridge that extends from petiole socket area to spiracle (carina may be obscured by setae); forewing with two submarginal cells ..... (stangei group) ..... 23
21. Forewing with two submarginal cells, the second not petiolate; tergum I simple apically, not reflexed nor with subapical transverse depression; northeastern North America ..... (agile group) ..... agile (Smith), p. 38
- Forewing with three submarginal cells, the second petiolate; tergum I with reflexed apical rim (with subapical transverse depression); Neotropical ..... (krombeini group) ..... 22
22. Propodeal dorsum and hindface densely covered with appressed silver or gold setae that obscure shiny surface; sternum I with appressed silver setae; disk of scutum shiny, parapsidal and admedian lines sulciform ..... krombeini Menke, p. 45
- Propodeal dorsum with dense appressed setae at base, but apex and hindface sparsely setose, not obscuring dull surface; sternum I with erect pale setae (not silver); scutum dull, parapsidal and admedian lines not sulciform ..... neotropicum Menke, p. 46



23. Ocellocular distance 1.38 to 1.65X hindocellus diameter; propodeal dorsum smooth, punctate; eastern and southeastern Brasil ..... plaumanni Menke, p. 40
- Ocellocular distance 1.08 to 1.31X hindocellus diameter; propodeal dorsum variable ..... 24
24. Upper interocular distance .76 to .80X the distance between eye notches, the latter shallow (fig. 78) ..... abathes Menke, p. 43
- Upper interocular distance .59 to .66X the distance between eye notches; eye notches deep (fig. 9) ..... 25
25. Pronotum rounded laterally, humerus at most with faint ridge (fig. 94); propodeal dorsum mostly ridged or striatopunctate; occipital carina complete ventrad; Bolivia, Argentina ..... stangei Menke, p. 41
- Pronotum angulate laterally, humerus with obvious ridge (fig. 98); propodeal dorsum mostly punctate (ridging restricted to base and short cross-carinulae associated with median carina); occipital carina interrupted ventrad; Panama to central Brasil ..... duckei Menke, p. 42
26. Propodeal side delimited dorsad by carina or crenulate ridge that extends from petiole socket area toward spiracle (figs. 27, 46) ..... 27
- Propodeal side without dorsal carina or ridge ..... 39
27. Eye length 10-20% less than distance between eye notches (fig. 10); propodeal dorsum without median longitudinal carina, surface smooth, punctate; labrum ending in two fingerlike lobes ..... (euryps group) ..... 28
- Eye length equal to or greater than distance between eye notches (fig. 15) (if 10% less than propodeal dorsum with median carina); propodeal dorsum with or without median longitudinal carina; labrum arcuate, or truncate or shallowly emarginate apically ..... 34
28. Females, gaster with 6 visible terga ..... 29
- Males, gaster with 7 visible terga ..... 31
29. Forewing with two submarginal cells, outer veinlet of submarginal cell I angled (fig. 11); clypeal lobe quadrangular, lower lip roundly triangular (figs. 124-125) ..... styphopteron Menke, p. 50
- Forewing with three submarginal cells; clypeus various ..... 30
30. Propodeal hindface with coarse, transverse ridges from top to bottom; upper interocular distance essentially equal to lower interocular distance ..... euryps Menke, p. 48
- Propodeal hindface smooth above, ridges present only next to petiole socket; upper interocular distance at most .8X as long as lower interocular distance ..... eu Menke, p. 47
31. Forewing with two submarginal cells, outer veinlet of submarginal cell I angled (fig. 11); flagellum without linear tyli or asetose, shiny areas ..... styphopteron Menke, p. 50
- Forewing with three submarginal cells (if only two then outer veinlet of I is straight); flagellomeres with asetose polished areas or linear tyli present on III-V ..... 32
32. Propodeal hindface smooth above, with transverse ridges only near petiole socket ..... eu Menke, p. 47
- Propodeal hindface with coarse transverse ridges from top to bottom ..... 33
33. Flagellomeres V-VI asymmetrically swollen in profile (fig. 126) ..... euryps Menke, p. 48
- Flagellomeres V-VI not swollen ..... lillo Menke, p. 49



34. Occipital carina a complete circle, separated from hypostomal carina by at least an ocellus diameter; pronotum with broad, transverse lamella anterodorsally (fig. 43) ..... (*fritzi* group) ..... 35
- Occipital carina incomplete ventrally, or contiguous with hypostomal carina; pronotum with or without anterodorsal lamella ..... 36
35. Carinae of propodeal dorsum mostly transverse, giving way to punctures laterally (fig. 47); anterior margin of pronotum with broad lamella laterally at level of pronotal lobe (fig. 45) ..... *fritzi* Menke, p. 31
- Carinae of propodeal dorsum oriented posterolaterally, extending nearly to lateral ridge (fig. 49); anterior margin of pronotum without lamella at level of pronotal lobe ..... *nosferatu* Menke, p. 32
36. Tarsomeres without conspicuous stout setae distally (fig. 71); episternal sulcus ending ventrad without curving forward to anterior margin of mesopleuron; propodeal dorsum with median longitudinal carina but smooth overall, appearing impunctate ..... *delicatum* Menke, p. 35
- Tarsomeres armed distally with conspicuous stout setae; episternal sulcus curving forward ventrally, reaching anterior margin of mesopleuron; propodeal dorsum punctate and/or covered by carinae ..... (*conforme* group) ..... 37
37. Disk of propodeal dorsum smooth, punctate, shiny, with median longitudinal depression that contains carina (fig. 25) ..... *conforme* Smith, p. 25
- Disk of propodeal dorsum obliquely carinate or striatopunctate, with or without median longitudinal depression and carina (figs. 28-29) ..... 38
38. Propodeal side almost entirely smooth, punctate; Mexico?  
..... *doggonum* Menke, p. 26
- Propodeal side striatopunctate on dorsal half (fig. 26); Ecuador to Bolivia  
..... some *larsoni* Menke, p. 29
39. Tergum I sharply depressed subapically, forming a broad band; propodeal side with a few large punctures scattered among dense, fine punctation (fig. 57); body 12.5 mm long or more ..... *eremnon* Menke, p. 33
- Tergum I without sharp subapical depression; punctures of propodeal side of uniform size; body 12 mm or less ..... 40
40. Propodeal dorsum with many carinae, at least basally (figs. 29, 31, 263), or striatopunctate ..... 41
- Propodeal dorsum at most with median, longitudinal carina, surface smooth punctate ..... (*cressoni* group\*) ..... 44
41. Pronotal collar thin, knife-edged, closely appressed to and lower than scutum; appressed silver setae confined to lower frons ..... (*conforme* group) ..... 42
- Pronotal collar as thick as metanotum, rounded, and nearly as high as scutum; head and thorax with extensive appressed silver setae .... (*chilense* group) .... 43
42. Ridges of propodeal dorsum obliquely oriented (fig. 29)  
..... some *larsoni* Menke, p. 29
- Ridges of propodeal dorsum longitudinally oriented when present (fig. 31)  
..... *eyvae* Menke, p. 27

\* Most species in this group are separated reliably only by rather subtle differences in the female clypeus and male genitalia. I have attempted to use other, more obvious differences in the key (color for example), realizing that they may not work for all material. Comparison with descriptions and figures should be made after arriving at a name in the key.



43. Wing veins amber; erect setae of head, thorax and legs black; terga I–III with bright silver fasciae; propodeal dorsum obliquely carinate/striatopunctate ..... chilense Spinola, p. 71  
 – Wing veins black; erect setae white; tergal fasciae dull; propodeal dorsum longitudinally carinate, interspaces impunctate ..... sylphe Menke, p. 73
44. Forewing with two submarginal cells (fig. 132) ..... 45  
 – Forewing with three submarginal cells (fig. 131) ..... 47
45. Legs yellowish brown except coxae; first segment of gaster almost entirely yellowish brown; female clypeus as in fig. 249; female tergum II strongly humped (fig. 251) ..... phthinylla Menke, p. 70  
 – Legs largely or completely black; gastral segment I black except pale apical band sometimes present on tergum; female clypeus as in figs. 160, 239, 241; female tergum II not humped ..... 46
46. Ocellocular distance .25 to .40X hindocellus diameter; female clypeus as in figs. 239, 241 ..... aranevorax Menke, p. 68  
 – Ocellocular distance .71X hindocellus diameter; female clypeus as in fig. 160 ..... erebus Menke, p. 57
47. Legs entirely yellowish brown (coxae and hindfemur above sometimes black) ... 48  
 – Legs black, or, at most, femora and tibiae a mixture of black and pale brown .. 50
48. Forewing media diverging from M+Cu before crossvein cu-a; female clypeus as in fig. 230; male clypeus as in fig. 231 ..... abothrum Menke, p. 67  
 – Forewing media diverging from M+Cu after cu-a ..... 49
49. Gastral segment I all black, no yellow apical band on tergum; tergum II strongly convex in lateral profile (fig. 162); tergum I longer than wide ..... martini Menke, p. 58  
 – Gastral segment I completely or extensively yellowish brown, tergum with yellow apical band; tergum II not unusually swollen; tergum I as long as wide ..... maculipenne Smith, p. 59
50. Scutellum more sparsely punctate posteriorly where very fine punctures are mixed with large punctures (fig. 142); female clypeal lobe reflexed (fig. 136) ..... cressoni Rohwer, p. 53  
 – Scutellum uniformly punctate, punctures of one size ..... 51
51. Upper interocular distance .86–.91X lower interocular distance in female, .92–1.0X in male ..... 52  
 – Upper interocular distance .57–.79X lower interocular distance in female, .69–.86X in male ..... 53
52. Female clypeus as in fig. 177; male flagellum with linear tyli at least on articles IV–VI; forewing media diverging from M+Cu before crossvein cu-a or interstitial with it ..... brasilium Menke, p. 61  
 – Female clypeus as in fig. 221; male flagellum without tyli; forewing media diverging after cu-a or interstitial with it ..... dementia Menke, p. 66
53. Propodeum largely covered by dense gold setae that obscure surface and ocellocular distance in female usually .82–1.16X hindocellus diameter, and in male .93–1.18X HOD; female clypeus as in figs. 149–151 ..... chrysops Menke, p. 55  
 – Propodeal surface largely or entirely visible, but if dense setae present on dorsum then ocellocular distance in female no more than .69X hindocellus diameter and in male no more than .85X HOD; female clypeus different ..... 54



54. Ocellocular distance 1.23X HOD; terga I-V with broad, yellow apical bands ..... pentafasciatum Menke, p. 58  
 - Ocellocular distance .33 to .85X HOD; yellow bands confined to terga I-III ..... 55
55. Female clypeus as in figs. 204, 206, 209; male flagellum with linear tyli on articles III-V or VI (fig. 213) ..... cameronii Kohl, p. 64  
 - Female clypeus as in figs. 166, 168-169, 186, 189, 192, 194; male flagellum without tyli ..... 56
56. Female clypeus with short median lobe whose margin is straight or slightly sinuate (figs. 166, 168-169), clypeal rim not elevated above adjacent punctation; male clypeus as in fig. 170; wing membrane sometimes yellowish ..... maculipenne Smith, p. 59  
 - Female clypeal margin above labrum with concavity bearing four angles or teeth (figs. 186, 189, 194), clypeal rim elevated above adjacent punctation (figs. 188, 196); male clypeus as in fig. 197; wing membrane never yellowish ..... arachniraptor Menke, p. 62

Conforme Group  
(Figs. 15-40)

Description:

Frons moderately swollen; labrum quadrangular; female mandible with weak mesal tooth on inner margin; male antenna simple, flagellomeres elongate; clypeal disk swollen, punctate; eye length slightly greater than or equal to distance between eye notches (fig. 15); occipital carina ending just before joining apex of hypostomal carina; pronotum without anterodorsal lamella, but with anterodorsal pit that is sometimes transversely elongate (fig. 16), this depression margined behind by carina, surface behind carina shiny and usually with several ridges; scutal flange of variable width; tegula punctate, setose on basal half, impunctate, smooth beyond; propodeal side sometimes delimited dorsad by crenulate ridge that extends from petiole socket to spiracle (absent in eyvae, sometimes absent in larsoni); propleuron sparsely punctate on disk; lower end of episternal sulcus curving forward to anterior margin of mesopleuron (evanescent ventrad in eyvae and females of larsoni); male foretrochanter without spine; outer carina of hindcoxa weak, reduced to distal ridge; hindtarsomere IV with small plantula; male tarsal claws symmetrical; forewing media diverging after crossvein cu-a; forewing marginal cell acuminate apically; three submarginal cells, inner and outer veinlets of III usually broadly separated on marginal cell; hamuli divided into two groups; gaster without yellow bands; tergum I single-edged apically; male sternum VIII rounded or truncate apically, not emarginate; genitalia robust, gonostyle slender and densely fringed with long setae apicoventrally, volsellar lobe large, feebly setose, aedeagus unusually broad (dorsal view, figs. 36, 40), penis valves fused over most of their dorsal length, each with apical horn (figs. 34, 38).

Included species:

Pison conforme, doggonum, eyvae, and larsoni.

Discussion:

The main features of this small group are the incomplete occipital carina, the projecting, rounded female clypeal lobe, the coarse cross-ridging of the propodeal hindface, and the non-emarginate male sternum VIII. The dorsolateral propodeal ridge is not universal and can only be termed an apomorphic trend. The globular form of the male genitalia is distinctive but males are unknown in two species. The conforme group does not appear to have a single universal apomorphic character state, and in fact it may be a paraphyletic group. When males of all species are known, perhaps an apomorphy will be found in the genitalia.

Pison larsoni and eyvae are sister species, sharing the thin, closely appressed pronotal collar, the absence (except in some larsoni) of a crenulate propodeal ridge,



and the evanescent episternal sulcus ventrad in the female. Pison conforme and doggonum have a thicker collar and a well formed crenulate ridge on the propodeum. Pison conforme, by virtue of its transverse pronotal pit and smooth propodeal dorsum, has a somewhat isolated position. Pison doggonum is fairly similar to larsoni in sculpture and general habitus.

Pison conforme Smith  
(Figs. 15-17, 19-20, 25, 33-36)

Pison conforme Smith, 1869:297. Holotype male: "Mexico" (BMNH).

Description, female (81 specimens):

Black; wings clear or slightly infumate. Frons with appressed silver setae on either side of antennal socket, sometimes dense enough to obscure sculpture, clypeus sometimes with similar setae laterally; erect setae on body pale; tergum I with broadly interrupted apical silver fascia.

Free margin of labrum with weak indentation. Clypeal lobe as in fig. 19, free margin not thickened or double-edged, surface smooth, polished. Frons dull, shallowly punctate, punctures one to two diameters apart; eye length slightly greater than distance between eye notches (fig. 15); UID 0.47-0.53X LID; OOD 0.33X HOD or less, usually about 0.20X HOD; flagellomere I length slightly less than to slightly more than 3X apical width, II about the same, III-X longer than broad.

Anterodorsal pit of pronotum transversely elongate, length equal to UID or greater, carina behind pit sometimes lamelliform (fig. 16); collar thin, laterally with linear impression that makes humeral angle prominent, ridgelike (fig. 16); scutum dull or weakly shiny, punctate, punctures usually slightly larger than those of frons and deeper, more sharply defined, separated by less than puncture diameter to two or more diameters (punctures finer than on frons and several diameters apart in specimens from Ecuador), interspaces imbricate (Harris, 1979), hind margin of scutum with short ridges; scutellum shiny or somewhat dull, punctures somewhat smaller than those of scutum; metanotum with micropunctures; disk of propodeal dorsum smooth, shiny, with sparse, fine, setigerous punctures similar in size to those of metanotum, usually with median longitudinal carina (sometimes reduced or absent in specimens from Ecuador) that extends from base to about middle of dorsum (fig. 25), this carina usually in depression (depression absent in specimens from Ecuador), base of dorsum with short perpendicular carinae; propodeal hindface with coarse, well spaced, cross-ridges that are continued onto posterolateral surface of dorsum, interspaces shiny, smooth; propodeal side smooth, shiny, finely punctate, punctures slightly larger, denser than those on propodeal dorsum; mesopleuron shiny, punctate, punctures same size as those on scutum and less than diameter to several diameters apart; metapleuron shiny, with pinprick punctures.

First recurrent vein usually ending near middle of second submarginal cell, rarely interstitial between I-II, second recurrent vein ending on submarginal cell III or interstitial between II-III.

Gaster shiny, terga I-II finely punctate, punctures several diameters apart, sternum II swollen in profile, often with vague gibbosity on midline at apical third.

Length 6.5-8.5 mm.

Male (33 specimens):

Same as female except: clypeus usually covered by dense, appressed silver setae; clypeal lobe as in fig. 20; UID 0.55-0.62X LID; OOD usually 0.25X HOD; scutum usually shiny; first recurrent vein usually ending near base of second submarginal cell, and second recurrent interstitial between II-III, but variety of other arrangements observed; apical margin of tergum VII arcuate; sternum II sometimes swollen, sometimes with vague gibbosity; sterna II-VI each with one or more long, erect setae posterolaterally; sternum VIII apex roundly truncate, slightly indented (fig. 17); genitalia as in figs. 33-36, aedeagus slightly curved in lateral profile, apical horns not sharply pointed (fig. 34); length 5.5-7.5 mm.



Discussion:

Pison conforme is commonly collected in Central America and northwestern South America. Within the conforme group the smooth, punctate propodeal dorsum with a median longitudinal carina usually set in a depression is distinctive, although the carina is absent in some Ecuadorian material. The transversely elongate pronotal pit, not easily seen unless the head is tipped forward, distinguishes conforme from larsoni and doggonum. Tergum VII is rounded apically in males of conforme, but in larsoni it is truncate. The aedeagus also differs between these two species (compare figs. 33-36 & 37-40).

I have studied Smith's type.

Range:

West central Mexico to Peru.

Material examined:

MEXICO, Jalisco: 9 mi. s Guadalajara (MCZ); Morelos: Cuernavaca (CU, USNM); Vera Cruz: Jalapa (UCD, USNM); Río Blanco (UCD); Rinconada (UCD); Fortin de las Flores (FSDA); Orizaba (UCD); Cordoba (GENEVA); Chiapas: San Cristobal de las Casas (CU, CNC); Bochil (UCD); Nachic (CU); L. Montebello N. P. (CNC). GUATEMALA: Sta. Emilia, Pochuta (USNM); San Jeronimo B. V. P. (AMNH); Helvetia, San Sebastian (MCZ); Las Sabanetas, Barbarena (MCZ); Moca, Guatalon (MCZ). EL SALVADOR: 3 mi. w Quezaltepeque (UCD); Mt. San Salvador (UCD). COSTA RICA: Turrialba (BERLIN); Santa Ana (MCZ); San José, San Antonio de Escazu (COOPER); San Pedro de Montes de Oca (USNM); San Jose (USNM, BMNH); Alajuela, Chomogo area (USNM); Monteverde (USU); Escazu (USU). COLOMBIA, Valle: Peñas Blancas, 10 km w Calí (CSDA, FSDA); Candelaria, Finca San Luis (CSDA); Pance CVC, 15 km w Cali (CSDA); Cali (BMNH); Boyaca: Muzo (MCZ); Cauca: Chisquio El Tambo (OSU); San Andres de Pisimbala, 60 km e Popayan (BMNH); Magdalena: N. Sierra Nevada de S., Marta, Rio Buritaca (BMNH); Vista Nieve, San Lorenzo Mt. (USNM); Putumayo: Mocoa (BMNH); Cundinamarca: 3 km n Alban (AMNH). ECUADOR, Pinchincha: Tinalandia near Sto. Domingo (PMA), 47 km s Santo Domingo, Río Palenque Sta. (CNC); Prov.?: Naranjapata (BPBM); Huigra (CU). PERU, Madre de Dios: Avispas (MCZ).

Pison doggonum Menke, n. sp.  
(Figs. 24, 27-28)

Description, holotype female:

Black; wings clear. Eye notches and lower frons with appressed silver setae that obscure sculpture, clypeus more sparsely covered by appressed silver setae; rest of head and thoracic vestiture pale or silvery; tergum I with silver fascia laterally, adjacent area of tergum II with some appressed silver setae.

Free margin of labrum straight. Clypeal lobe as in fig. 24, free margin not thickened or double-edged, surface smooth, not highly polished. Frons dull, shallowly punctate, punctures one to two diameters apart; eye length slightly greater (1.03X) than distance between eye notches; UID 0.47X LID; OOD 0.06X HOD; flagellomere I length 3X apical width, II almost as long, III-X longer than broad.

Anterodorsal pit of pronotum oval, greatest width about equal to hindocellus diameter; collar thin, humeral angle not ridgelike; scutum dull, densely punctate, punctures same size as on frons but mostly less than diameter apart, hindmargin of scutum with short ridges; scutellum weakly shining, punctuation similar to scutum; metanotum more finely punctate than scutellum; disk of propodeal dorsum impunctate, weakly shiny, with median longitudinal carina and many fine, somewhat irregular, oblique carinae that fade posterolaterally where surface becomes punctate (figs. 27-28); propodeal hindface with several widely spaced transverse ridges that become weaker dorsad; propodeal side shiny, smooth (except for a few ridges adjacent to spiracle), with shallow, setigerous punctures that are one to two



diameters apart; mesopleuron smooth, shiny, punctate, punctures same size as those on scutum but one to three diameters apart; metapleuron microridged above, smooth, shiny, impunctate below.

First recurrent vein ending on submarginal cell I on left forewing, interstitial on right forewing, second recurrent vein interstitial on left wing, ending on submarginal cell III on right wing.

Gaster shiny, terga with very fine pinprick punctures; sternum II normal, not swollen.

Length 7 mm.

Male:

Unknown.

Discussion:

Pison doggonum is rather enigmatic since only one specimen is known, but several features separate it from larsoni, its most similar relative: free margin of labrum straight (usually shallowly emarginate in larsoni), hindocellus nearly touching eye (OOD 0.11–0.30X HOD in females of larsoni), pronotal pit as broad as hindocellus (smaller than ocellus in larsoni), sculpture of propodeal dorsum fine (coarser in larsoni, compare figs. 27–28, 29–30), and propodeal side nearly all punctate (diagonally striatopunctate on dorsal half in larsoni). Pison doggonum is a more finely punctate wasp than larsoni and the latter species has a thinner pronotal collar.

Range:

Presumably Mexico. The type specimen is labelled simply, "Mejico, Mus. Drews."

Type:

Holotype female: "Mejico" (ZMC).

Etymology:

The name doggonum is a Latinization of the American slang expression, "dog gone it", in this instance a reflection of my frustration at having only one specimen with poor collecting data.

Pison eyvae Menke, n. sp.  
(Figs. 23, 31–32)

Description, holotype female:

Black, wings clear. Body with pale erect vestiture (darkest on scutum) that is longest on propodeal hindface, mesopleural venter and underside of coxae and trochanters; lower frons with dense, appressed, tarnished silver setae that obscure sculpture; no tergal fasciae.

Labrum quadrangular, margin entire. Clypeus with prominent truncate median lobe with rounded corners, free edge not thickened (fig. 23). Frons dull, granular, shallowly punctate, punctures one to two diameters apart. Eye length 1.04X distance between eye notches; UID 0.48X LID; OOD 0.20X HOD. Flagellomeres I–III each 3X as long as apical width, flagellomere X length 2X apical width.

Pronotum with transversely elongate anterodorsal pit that is margined behind by sharp lamelliform carina whose length is less than UID; collar thin, closely appressed to and lower than scutum. Scutal flange broad posterad, strongly reflexed. Scutum and scutellum dull, densely punctate, most punctures less than diameter apart. Metanotum weakly shiny, densely micropunctate. Propodeum shiny; dorsum densely, finely punctate but with about dozen, short, coarse ridges at base, the two center ridges extending posterad toward apex delimiting linear depression (fig. 32), dorsum laterally with gently arcuate, linear depression that extends from base to near apex; hindface impunctate, with about seven coarse cross-ridges that curve onto propodeal side where they change to fine striatopunctation; propodeal side densely punctate on



lower half, finely obliquely striatopunctate above but without delimiting ridge. Mesopleuron shiny, densely punctate, punctures one to two diameters apart. Episternal sulcus evanescent as it curves forward ventrad, not clearly reaching pleural margin. Metapleuron shiny, densely micropunctate.

First recurrent vein ending at middle of second submarginal cell, second recurrent vein ending on third submarginal cell.

Gaster shiny, finely punctate, punctures several diameters apart on terga I-II.  
Length 9 mm.

Variation in females (8 specimens):

Wings sometimes weakly infumate (Colombia). Appressed setae of frons sometimes silver (Colombia). Margin of clypeal lobe sometimes arcuate. UID 0.43-0.49X LID (Colombia, Ecuador), or 0.52X LID (Bolivia); OOD 0.17-0.21X HOD (Colombia, Ecuador), or 0.25-0.26X HOD (Bolivia). Carina behind anterodorsal pit of pronotum very high, longer than UID (Bolivia). Propodeal dorsum varies: often only one median, longitudinal carina present (fig. 31), sometimes all basal ridges may be short, i.e., no long median longitudinal carina or carinae, and disk only punctate (Bolivia), or many basal ridges may extend posterad changing to fine, arcuate striatopunctation that covers most of disk with middle ridge strongest and straight (Colombia, fig. 31), lateral arcuate linear depression sometimes absent; propodeal side nearly entirely punctate or irregularly covered with oblique carinulae that are continuations of coarse ridges of hindface (this latter condition occurs in specimens with striatopunctate dorsum). First recurrent vein occasionally interstitial between submarginal cells I-II or ending near base of second submarginal; second recurrent vein sometimes interstitial between submarginals II-III. Length as short as 7.0 mm.

Male:

Unknown.

Discussion:

Pison eyvae differs from other members of the conforme group, except larsoni, in having an episternal sulcus that becomes evanescent ventrally as it curves forward toward the pleural margin. Pison eyvae is similar to larsoni in the narrow, closely appressed pronotal collar, female clypeal shape, head measurements, and wing venation, but the sculpture of the propodeal dorsum, though variable, is distinctive in eyvae. The basal ridges are more or less longitudinally oriented, and when long, they curve in a gentle arc toward the apex (figs. 31-32). The uppermost of the lateral, anterad extensions of the coarse ridges on the hindface are similarly curved when viewed from above, thus accentuating the affect. Pison eyvae usually lacks a crenulate ridge at the top of the propodeal side (weakly formed in some specimens), but the ridge is sometimes present in larsoni.

Range:

Known only from Colombia, Ecuador and Bolivia.

Types:

Holotype female: ECUADOR, Morona-Santiago: Macas, 1100 m, II-2-1982, M. Cooper (COOPER).

Paratypes (8 females): COLOMBIA, Valle: Lago Calima, 3 mi. behind dam, tropical wet forest, VII-16-75, R. C. Wilkerson (CSDA, FSDA). ECUADOR: same data as type; Pichincha: Nambillo Valley nr. Mindo, 1450 m, VI-26-87, VII-2-87, M. Cooper (COOPER). BOLIVIA, La Paz: Chulumani, 1700 m, IV-3-79, M. Cooper (BMNH), Coroico, 1700 m, V-22-79, M. Cooper (BMNH).

Etymology:

The name eyvae is an arbitrary, euphonious combination of letters.



Pison larsoni Menke, n. sp.  
(Figs. 18, 21-22, 26, 29-30, 37-40)

Description, holotype male:

Black; wings slightly infumate. Frons with appressed tarnished silver setae between and lateral to antennal sockets; rest of head and body vestiture pale but generally brownish; no tergal fasciae.

Free margin of labrum semicircularly emarginate. Clypeal lobe polished (fig. 22). Frons dull, punctate, punctures separated by one to two diameters, interspaces appearing granulate; eye length equal to distance between eye notches; UID 0.59X LID; OOD 0.36X HOD; flagellomere I length about 2.5X apical width, remaining flagellomeres progressively shorter, VIII-X about as long as broad, flagellomeres II-IV each with a tiny, pale, oval sensory area on ventral side toward base, that on III the largest.

Anterodorsal pit of pronotum transversely oval, greatest width shorter than hindocellus diameter; collar thin, closely appressed to and lower than scutum, humeral area not ridgelike or otherwise prominent. Scutum dull, punctures same size as those on frons, but somewhat deeper and mostly one diameter apart, interspaces granular; hindmargin of scutum with short ridges. Scutellum weakly shiny, more sparsely punctate than scutum. Metanotum densely, finely punctate. Propodeal dorsum shiny, with oblique ridges basally and cross-ridges along center line, these changing to striatopunctuation laterally; propodeal hindface with irregular, coarse cross-ridges that become weaker dorsad; propodeal side shiny, obliquely striatopunctate on dorsal half and near hindcoxa, punctate elsewhere (similar to fig. 26), side with irregular crenulate ridge dorsally. Mesopleuron shiny, smooth, punctate, punctures larger than on scutum and about one diameter apart. Metapleuron striatopunctate above, finely punctate below.

First recurrent vein of forewing ending on submarginal cell II, second recurrent vein interstitial between submarginal cells II-III.

Gaster shiny, terga I-II finely punctate, punctures one to three diameters apart; tergum VII somewhat drawn out apically, truncate; sterna II-III with one long, erect seta posterolaterally, IV-VI each with two long, erect setae posterolaterally; sternum VIII broad, angularly rounded apically (fig. 18); genitalia as in figs. 37-40, aedeagus strongly arcuate in lateral profile (fig. 37), apical horns acuminate (fig. 38).

Length 7.5 mm.

Female (7 specimens):

Same as male except: free margin of labrum shallowly emarginate or truncate; clypeus as in fig. 21; UID 0.50-0.54X LID; OOD 0.11-.30X HOD; flagellomere I length 3X apical width, VII-IX longer than wide; scutal punctures mostly half diameter apart; scutellar punctures slightly smaller than those of scutum, less than diameter apart; propodeal dorsum usually with median, longitudinal carina that may be short (figs. 29-30), oblique ridging usually longer, coarser (fig. 29); propodeal side not clearly delimited by crenulate ridge in 5 Ecuador specimens from Nambillo, striatopunctuation sometimes covers all of side; episternal sulcus evanescent ventrally as it curves forward; second recurrent vein usually interstitial between submarginal cells II-III, but ending on II in one specimen and on III in another; sternum II with one long, erect seta posterolaterally as in male, but succeeding sterna with more numerous long setae that are more mesal; length 6.5-7.5 mm.

Discussion:

Pison larsoni has a thin pronotal collar that is lower than and closely appressed to the scutum, a character state shared only with eyvae. The sculpture of the propodeal dorsum, though variable in both species, separates the two: ridges, when present, are primarily longitudinal in eyvae (figs. 31-32), but oblique or transverse and always present in larsoni (at least in females, figs. 29-30). In five of the eight specimens of larsoni the crenulate ridge delimiting the top of the propodeal side is evanescent or absent, a constant characteristic of eyvae. Like eyvae, the female episternal sulcus is evanescent ventrally in larsoni. The striatopunctate upper part of



the propodeal side of larsoni separates it from doggonum. The ocellocular distance is wider in larsoni than doggonum but too few specimens are available to determine the reliability of this difference. The genitalia of larsoni differs from that of conforme especially in the strongly arched aedeagus and sharp apical horns (compare figs. 37-38 & 33-34).

Range:

Known only from Ecuador, Peru and Bolivia.

Types:

Holotype male: BOLIVIA, La Paz: San Jacinto, 1700 m, XII-5/8-55, L. Peña (KU).

Paratypes (7 females): ECUADOR, Morona-Santiago: Cord. de Cutucu, 6 km e Macas, 1100 m, V-22-87, M. Cooper (COOPER); Pichincha: Nambillo Valley nr. Mindo, 1450 m, VI-27/28-87, VIII-15-87, M. Cooper (COOPER). PERU, Cuzco: Valle del Río Cosñipata, Hacienda Santa Isabel, 1700 m, I-3-52, F. Woytkowski (LILLO).

Etymology:

Pison larsoni is dedicated to Gary Larson whose "The Far Side" cartoons have brought much laughter to me and many other entomologists.

Fritzi Group  
(Figs. 41-52)

Description:

Frons swollen; eye asetose; male antenna with vague sensory areas on some flagellomeres; female clypeal lobe trapezoidal or roundly truncate, male clypeal lobe triangular; labrum quadrangular; female mandible with weak mesal tooth on inner margin; occipital carina a complete circle, separated from hypostomal carina by hindocellus diameter or slightly more; pronotum with transversely elongate, polished depression that is margined anteriorly by broad, thin, setose, overhanging lamella; pronotal collar thick but front face flattened broadly at middle; thorax elongate, length in lateral profile about 2X height; scutal flange narrow, upturned; tegula densely punctate on inner half, impunctate beyond; propodeal side delimited dorsad by crenulate ridge that extends from petiole socket to spiracle; propodeal dorsum finely cross-carinate and/or striatopunctate; propleuron punctate; lower end of episternal sulcus curving forward to edge of mesopleuron; outer carina of hindcoxa reduced to short, evanescent, distal ridge; male foretrochanter without spine; plantulae present on tarsomeres II-IV or III-IV; male tarsal claws symmetrical; forewing media diverging after crossvein cu-a; forewing with three submarginal cells; endpoint of recurrent veins highly variable: first to submarginal cell I or II or interstitial, second to submarginal cell II or III or interstitial; gaster without yellow bands; tergum I single-edged apically; male sternum VIII with semicircular emargination apically; genitalia dorsoventrally flattened, penis valve without apical horn, gonostyle densely covered by long, coarse setae ventrally, volsellar lobes feebly setose.

Included species:

Pison fritzi and nosferatu.

Discussion:

This small group of rather dull, densely punctate wasps is characterized by the complete occipital carina that is separated from the hypostomal carina, the dorsal lamella associated with the elongate depression of the pronotum, the thick pronotal collar, the lateral ridge of the propodeum, the apically emarginate male sternum VIII, and the elongate body. The fritzi group is otherwise similar to the conforme group but the male genitalia are robust in the latter and dorsoventrally flattened in the former. Apomorphies are the pronotal lamella, transverse pronotal pit, the propodeal ridge, and emarginate male sternum VIII. The greatly elongate, polished, flat,



pronotal depression of this group is clearly homologous with the anterodorsal pit of smaller dimensions common in most species of Pison. One species, fritzi, has two lamellae on the pronotum: the one associated with the anterodorsal pit, and one that arises from the front margin of the notum. The last is lamelliform only laterally, narrowing toward the midline of the pronotum.

Pison fritzi Menke, n. sp.  
(Figs. 41, 43, 45-47, 50-52)

Description, holotype female:

Black; wings clear. Clypeus laterally and lower half of frons except for narrow zone above each antennal socket, densely covered with appressed tarnished silver setae that obscure sculpture, disk of clypeus sparsely covered with somewhat darker setae; terga I-II with brownish fasciae apically; vestiture of thorax (except on collar and propodeum posteriorly) and gaster brownish.

Free margin of labrum slightly arcuate; clypeal lobe roundly trapezoidal (similar to fig. 41), its polished surface curving down to free margin, clypeal disk variably densely punctate. Frons dull, densely but shallowly punctate, punctures separated by about half a diameter; eye length greater than distance between eye notches (latter = 0.91X eye length); UID 0.67X LID; OOD 0.42X HOD; flagellomere I length 2.5X apical width, remaining flagellomeres progressively shorter.

Anterior margin of pronotum with broad, partly setose, polished lamella at level of pronotal lobe that narrows dorsad where it is paralleled behind by setose lamella that overhangs greatly elongate depression (similar to figs. 43, 45), length of depression about three-fourths width of collar, depression delimited by carina posteriorly; collar thicker than metanotum; scutum dull, with same dense punctation as frons; scutellum weakly shiny, somewhat less densely punctate than scutum; metanotum weakly shiny, more finely punctate than scutellum; propodeal dorsum with many oblique carinae basally that blend with many parallel, arcuate, cross-carinae along midline that change to dense, oblique striatopunctation laterally (similar to fig. 46), no median longitudinal carina; propodeal hindface with several coarse cross-ridges at petiole socket but striatopunctate above; propodeal side densely punctate, almost striatopunctate, punctures separated by half diameter or less, interspaces shiny; mesopleuron densely punctate, interspaces weakly shiny, punctures separated by one diameter or less and larger than elsewhere on body; metapleuron densely punctate, punctures smaller, shallower ventrad; plantulae present on tarsomeres II-IV.

First recurrent vein interstitial between submarginal cells I-II, second recurrent ending on submarginal cell III.

Tergum I more coarsely punctate than succeeding terga, punctures about same size as those on scutellum and separated by less than puncture diameter; posterior margin of tergum I broadly depressed (equal to width of fascia or breadth of metanotum at midline).

Length 9 mm.

Variation in females (9 specimens):

Labrum sometimes truncate; UID 0.63-0.71X LID; OOD 0.44X HOD in Ecuador specimen; propodeal dorsum with well formed median longitudinal carina in one specimen from Nova Teutonia, Brasil; cross-ridges of propodeal hindface present nearly to top in some specimens; apical depression of tergum I especially deep in Ecuador specimen; end point of recurrent veins highly variable with many combinations observed even in different wings of one specimen; length 7-9.5 mm.

Male (1 specimen):

As in female except: clypeal lobe triangular; distance between eye notches 0.94X eye length; UID 0.86X LID; OOD 0.62X HOD; flagellomere I length slightly more than 2X apical width, III-V with vague sensory areas ventrally and slightly



asymmetrically swollen; scutal punctures larger, deeper than those of frons; tergum VII narrowly truncate; genitalia as in figs. 50-52; apicoventral surface of gonostyle densely clothed with long, coarse, curved setae; penis valve slender, shorter than gonostyle.

#### Discussion:

The most diagnostic feature of fritzi is the anterolateral lamella on the pronotum (fig. 45). Pison nosferatu has only an anterodorsal setose lamella. The orientation of the carinae on the propodeal dorsum also differs between the two species. They are arcuately transverse in fritzi, but in nosferatu all the carinae are oriented obliquely at about a 45° angle (compare figs. 46-47 & 48-49).

#### Range:

Pison fritzi is known from Ecuador, southern Brasil and northwestern Argentina.

#### Types:

Holotype female: BRASIL, Santa Catarina: Nova Teutonia, XII-1-1955, F. Plaumann (USNM).

Paratypes (10 specimens): ECUADOR, Tungurahua: Pastaza Valley, 1600 m, VIII-25-87, ♀, M. Cooper (COOPER). BRASIL, Santa Catarina: Nova Teutonia, various dates, 6 ♀, F. Plaumann (MCZ, UCD); Blumenau, I-1885, ♀, Hetschko (VIENNA); Guanabara: Represa do Río Grande, VI-66, ♀, M. Alvarenga (AEI). ARGENTINA, Salta: Rosario Lerma, II-85, ♂, M. Fritz (FRITZ).

#### Etymology:

It is a pleasure to name this wasp after one of South America's best wasp collectors, Manfredo Fritz.

#### Pison nosferatu Menke, n. sp. (Figs. 42, 44, 48-49)

#### Description, holotype female:

Black; wings slightly infumate. Frons with appressed tarnished silver setae between eye and antennal socket and between the sockets; terga I-II with brownish fasciae apically, III-IV with weak fasciae; vestiture of body generally pale or brownish.

Free margin of labrum weakly concave; clypeal lobe double-edged (similar to fig. 42); eye length only slightly greater than distance between eye notches (latter = 0.96X eye length); UID 0.63X LID; OOD 0.30X HOD; flagellomere I length almost 3X apical width; frons dull, punctation as described for fritzi but somewhat coarser.

Anterior margin of pronotum without lamella laterally, but with setose lamella that overhangs anterodorsal depression, the latter not delimited posteriorly by carina (similar to fig. 44); collar about as thick as metanotum; scutum dull, punctation same as fritzi but somewhat coarser; scutellum weakly shiny, punctation as in fritzi, metanotum as described for fritzi but punctures somewhat larger; propodeal dorsum covered by obliquely oriented carinae, those that cross midline forming rounded V's, carinae changing to striatopunctation posterolaterally, dorsum without clearly defined median longitudinal carina (fig. 49); propodeal hindface with three widely spaced, coarse cross-ridges, interspaces shiny, impunctate, upper third of hindface punctate; propodeal side densely punctate changing to vertical striatopunctation dorsad; mesopleuron shiny, densely punctate, punctures largest on body, separated by one or two diameters and changing to weak horizontal striatopunctation beneath scrobe; metapleuron striatopunctate above, obscurely punctate below; plantulae present on tarsomeres III-IV.

Recurrent veins interstitial in left forewing, first ending on second submarginal cell and second ending on third submarginal cell in right wing.

Gaster as described for fritzi except that depressed margin of tergum I narrower



than breadth of metanotum and less sharply defined.  
Length 9.5 mm.

Variation in females (1 specimen):

OOD 0.37X HOD; propodeal hindface with cross-carinae to top, upper carinae somewhat less coarse (fig. 48); length 9 mm.

Male:

Unknown.

Discussion:

Pison nosferatu is similar to fritzi, but the absence of a polished lamella laterally on front edge of the pronotum is distinctive. The female clypeal lobe differs between the two species also (compare figs. 41–42). The punctation of nosferatu is somewhat coarser than that of fritzi, a difference difficult to appreciate without material of both species. The carinae of the propodeal dorsum are more oblique in nosferatu, being oriented at an angle of about 45° to the linear axis. In fritzi the carinae are more transverse (compare figs. 46–47 & 48–49).

Range:

Known only from Venezuela.

Types:

Holotype female: VENEZUELA, Aragua: Rancho Grande, 1100 m, I-22/23-1978, blacklight in cloud forest, J. B. Heppner (USNM). One paratype female with same data (USNM).

Etymology:

The name nosferatu, a noun in apposition, is from the 1922 German movie Nosferatu, based on the story of Dracula by Bram Stoker. In the movie, Nosferatu was a pseudonym for the vampire Dracula.

### Eremnon Group

#### Pison eremnon Menke (Figs. 53–63)

Pison eremnon Menke, 1968a:5. Holotype female: Santarém, Brasil (CMP).

Description:

Body completely black, leading edge of fore and hindwings darkly infumate. Head and thorax (including the coxae, trochanters and femora) with much long, erect black setae. Tergum I and sterna with similar erect vestiture, but sparser on latter. Pale pubescence present only posterolaterally on propodeum and short.

Head, thorax and terga I–II mostly bipunctate: large punctures scattered among many finer punctures (fig. 57). Nearly all punctures of disk of scutum and scutellum large (larger than any others on body), separated by one to six diameters, interspaces smooth, shiny. Propodeal dorsum covered with small punctures (no large punctures) that change to striatopunctation laterally. Terga III–V or VI densely, finely punctate, dull or weakly shiny. Tergum III with few slightly larger punctures scattered over surface. Sterna II–V shiny, irregularly punctate; punctures small, densest peripherally but mixture of large and small sparse punctures present on disk of female. Male sterna III–VI largely impunctate except laterally. Hindtibia with two to four short, very stout setae on outer surface that are borne on slight elevations, as well as several similar but more slender setae scattered over the surface in pits. Midtibia sometimes with single, stout seta.



Head differs strongly between sexes: male with broad face and short clypeus in comparison to female (see figs. 54–55). Median lobe of clypeus with broad, smooth shiny lip in both sexes that is not thickened. Female clypeus without brush. Eye asetose. Male UID 0.72X LID, female UID 0.64X LID. OOD 3.2X HOD in male, 1.38X HOD in female. Occipital carina broadly incomplete ventrally. Female mandible with weak median tooth on the inner margin, but that of male edentate. Mandible socket nearly closed off by extension of hypostoma. Anterodorsal pronotal pit transversely elongate, deep, margined posterad by sharp lamelliform carina; width of pit about 0.66X UID. Collar as high as scutum, thicker than metanotum, in female with median elevation suggestive of *Lyroda*. Tegula impunctate on outer half. Propodeum with median longitudinal carina dorsally but no ridge present between spiracle and petiole socket. Propodeum posterolaterally with 5 or 6 coarse, transverse ridges above petiole socket that become progressively finer dorsad. Propleuron mostly punctate, but with small, shiny impunctate area present laterally on disk. Episternal sulcus curving forward ventrad attaining pleural margin. Hindcoxa with fine outer carina that evanesces basad. Tarsomeres II–IV with plantulae. Forewing marginal cell rounded distally (fig. 53). Submarginal cell I longer, narrower than typical for New World members of genus, resulting in petiole of submarginal cell II ending at midpoint of marginal cell (fig. 53). Recurrent veins terminate on submarginal cells II and III, respectively. Forewing media diverges from M+Cu basad of crossvein cu-a. Hamuli of hindwing not divided into two groups. Tergum I elongate, apical width slightly less than three-fourths its length, and hindmargin broadly depressed forming bandlike margin that is as broad as metanotum. Male abdomen unusual: tergum VI deeply emarginate, VII ending with pair of rounded lobes (fig. 56); sternum II strongly swollen in profile, it and subsequent sterna bearing subapical transverse setose flanges that diminish progressively posterad, being represented on sterna IV–VI by setose depressions (figs. 58–59); sternum VIII ending in pair of blunt lobes (fig. 60). Genitalia laterally compressed; gonobase elongate, with longitudinal crest dorsally (figs. 61–62); gonostyle long, narrow, setose; and volsellar lobes elongate, setose apically, narrow in ventral view (fig. 63); aedeagus broad in dorsal view (fig. 61) but otherwise a fairly simple structure without defined head or ventral spine.

Length 12.5–16 mm.

#### Discussion:

*Pison eremnon* is the largest New World species of the genus, and it has many unique attributes. The shiny, irregularly bipunctate, black body, the dark erect setae of the head, thorax and legs, the wing venation and infumate leading edge of the forewing, the nearly closed mandible socket, the stout setae of the hindfemur, the elongate tergum I with its depressed bandlike hindmargin, and the male abdominal features readily identify *eremnon*. The male is identified here for the first time and is represented by a single specimen from Pachitea, Peru (BERLIN). The long volsellar lobes are distinctive (fig. 63).

The distally rounded forewing marginal cell and elongate submarginal cell I (fig. 53), the abdominal structure especially in the male (figs. 58–59), the nearly closed mandible socket, and head dimorphism (figs. 54–55) are unique attributes of *eremnon* that isolate it from all other the neotropical groups in the genus. I regard the nearly closed mandibular socket, the head dimorphism, and abdominal structures as apomorphies of the *eremnon* group.

The nearly closed mandible socket is an interesting feature since it approaches the condition typical of the Philanthinae, where a closed socket is one of the prime characteristics that separate that subfamily from the Larrinae. The head of the male of *eremnon* is reminiscent of some species of *Philanthus* because of the notched eyes, the broad face and narrow clypeus.

Strong head dimorphism occurs in the Old World species *regale* Smith and *strandi* Yasumatsu and their males have abdominal peculiarities suggestive of *eremnon*. But in *regale* and *strandi* the propodeum has a crenulate ridge between the spiracle and petiole socket, the mandible socket is broadly open, the mandible has a subbasal tooth on the cutting edge, the wing venation is different, and the male genitalia are



dissimilar. A relationship between eremnon and these two Old World species, if any, does not appear close.

Range:

Colombia to Peru, Guyana and northern Brasil.

Material examined (19 females, 1 male):

COLOMBIA, Putumayo: Mocoa, 600 m, various dates, M. Cooper (BMNH); Villa Garzon, 8 km s Mocoa, various dates, M. Cooper (BMNH, COOPER); Amazonas: La Chorrera, VIII-14/23-76, M. Cooper (BMNH); Leticia, VIII-21/29-74, M. Cooper (BMNH); Meta: La Macarena, X-7/XI-29-76, M. Cooper (BMNH); Caqueta: Yuruyaco, 73 km sw Florencia, II-5-79, M. Cooper (BMNH). ECUADOR, Morona-Santiago: Taisha, 500 m, I-21-82, M. Cooper (COOPER). PERU, Pasco: Puerto Bermudez, 500 m, XI-8-84, M. Cooper (COOPER); Huanuco: Rio Pachitea, Tessman, (BERLIN). GUYANA: Wanaina, N.W. District, III-31, J. Meyers (BMNH).

Delicatum Group

Pison delicatum Menke, n. sp.  
(Figs. 64-76)

Description, holotype male:

Black, mandible yellowish brown, inner surface of foretibia brown; wings weakly stained but forewing with clear area near third submarginal cell. Body without long erect setae, and mostly covered by fairly dense, pale, short setae that impart a velvety appearance; clypeus and lower half of frons with dense, appressed silver setae that obscure sculpture; terga I-III with broadly interrupted silver fasciae.

Labrum short, broad, free margin entire, slightly arcuate; clypeal free edge thickened, without prominent median lobe, but with very short, broad lobe defined by polished part of thickened edge, this lobe with weak, rounded, median tooth (similar to fig. 66); frons moderately swollen, dull, contiguously micropunctate, appearing granular; eye asetose, eye length 0.95X distance between eye notches; LID 0.83X UID; OOD 1.33X HOD; antenna clavate, flagellomere I length slightly more than 2X apical width (10:4), V-X broader than long; occipital carina incomplete ventrally, ending just before hypostomal carina.

Pronotum with transversely elongate, polished anterodorsal depression whose length is equal to about half width of collar, this depression delimited anteriorly by high lamella (similar to fig. 67); collar slightly thicker than metanotum, noncarinate, but with shallow, anteromedian depression that narrows top of collar at midline; thorax shiny; scutal flange narrow, upturned; scutum densely micropunctate, punctures separated by about puncture diameter; tegula completely densely, micropunctate; scutellum margined anteriorly by narrow sulcus that is vaguely foveolate, punctures of scutellum sparser than on scutum; metanotum impunctate; propodeal dorsum with median longitudinal carina in shallow depression, surrounding surface smooth, sparsely covered with setose micropunctures; propodeal hindface with coarse cross-ridges that become weaker toward top; propodeal side with crenulate ridge between spiracle and petiole socket, side smooth, densely but very shallowly punctate, punctures about two diameters apart, lower end of propodeal spiracle surrounded by chain of small foveolae; propleuron finely punctate; episternal sulcus ending ventrally, not curving forward to anterior margin of mesopleuron; punctation of mesopleuron similar to scutum; mesopleural sulcus paralleled anteriorly by row of foveolae; metapleuron more sparsely, finely punctate than mesopleuron; metapleural flange not lamelliform.

Forewing media diverging after crossvein cu-a; forewing with three submarginal cells, inner and outer veinlets of III narrowly separated on marginal cell, recurrent vein I ending on submarginal I, recurrent vein II ending on submarginal cell II.

Legs smooth, devoid of conspicuous spiniform setae at apices of tarsomeres;



tarsomere IV with tiny plantula; tarsal claw thick to just before apex where it terminates in a sharp, somewhat hooked point; midcoxa margined anterad by ridge associated with precoxal sulcus; dorsum of hindcoxa with strong inner carina, but outer carina reduced to short evanescent distal ridge.

Distal edge of tergum I simple, surface of tergum I weakly shining, coriarius (see Harris, 1979) and obscurely punctate, punctures about a diameter apart; tergum II shiny, smooth, punctate; distal margin of tergum VII with broad, obtuse emargination; sterna III-V with discal mats of decumbent, long, white setae (as in figs. 68-69); sternum VIII with broad, apical V-notch (as in fig. 69); genitalia as in figures 73-76, aedeagus broad in dorsal view (fig. 76) and with unusual head (figs. 73-75) that has a nearly circumferential lamella ventrally that is joined at midventer by another lamella; gonostyle with usual long setae but subapically with area of dense, very short setae (fig. 74); volsellar lobes elongate, feebly setose.

Length 5 mm.

#### Variation in males (20 specimens):

Mandible varies from yellow to nearly black. Mid and hindtibiae sometimes brownish within, sometimes legs completely black. Eye length sometimes as short as 0.90X distance between eye notches. LID sometimes only 0.76X UID. OOD 1.28-1.46X HOD. Ridges of propodeal hindface sometimes evanescent laterally and dorsad, occasionally hindface has only two or three ridges just above petiole socket with remainder smooth, punctate. Forewing media sometimes interstitial with cu-a. First recurrent vein sometimes interstitial between submarginal cells I-II in one or both wings, second recurrent rarely ending on third submarginal. Tergum I sometimes smooth, shiny, and clearly punctate. Length to 7 mm.

#### Female (22 specimens):

As in male except: edge of clypeus sometimes yellowish brown; vestiture sometimes dull silver; mandible with median cleft on inner margin, but no tooth; labrum arcuate; clypeus without prominent median lobe, free edge thickened at middle and produced into arcuate lower lip (figs. 64-65); eye length 0.92-0.97X distance between eye notches; LID 0.74-0.84X UID; OOD 1.24-1.53X HOD; flagellomere I length 2.5-3X apical width; punctuation of scutellum about as dense as on scutum, metanotum with similar but sparser punctures; cross-ridges of propodeal hindface as variable as in male; veinlets of submarginal cell III sometimes meeting on marginal cell; first recurrent vein ending on first submarginal cell in 50% of the specimens, interstitial in about 50%, rarely both ending on second submarginal cell; length 6-8 mm.

#### Discussion:

Pison delicatum, a commonly collected species, has a distinctive velvety appearance due to a general covering of short setae on the body and an absence of erect setae. This look is enhanced by the dense micropunctures distributed generally over the body. Distinctive features of the species are the straight episternal sulcus, the ridge at the top of the propodeal side, the very elongate depression of the pronotum (fig. 67), and the hair mats on male sterna III-V (fig. 68-69). The elongate pronotal depression is similar to the condition in the fritzi group, and the lamella bordering it is probably homologous with the structure found in that group and the krombeini group. The lamellae of the aedeagal head are distinctive and make the genitalia unlike any other New World species (figs. 73-74).

Apomorphies of the delicatum group are the broad face (fig. 64), the clavate antenna with distal flagellomeres wider than long, the non-spiny legs with peculiar broad tarsal claws (figs. 70-72), the straight (incomplete) episternal sulcus, the propodeal ridge, the long pronotal depression (fig. 67), and the hair mats of the male sterna (figs. 68-69). The antenna, absence of erect body setae, tarsal claws and completely punctate tegula are shared with the krombeini and stangei groups, but they have densely setose eyes (an apomorphy) and an episternal sulcus that curves forward ventrally to the anterior margin of the mesopleuron. The krombeini group differs from the delicatum group in possessing a broad lamella on the anterior



margin of the pronotum (an apomorphy), in lacking a lateral ridge on the propodeum, and in having a complete occipital carina. The male abdominal sterna have specialized areas in delicatum and krombeini groups, but they are dissimilar and presumably this is convergence.

The delicatum and stangei groups share the propodeal ridge that extends between the propodeal spiracle and petiole socket, but in the stangei group there are only two submarginal cells and the eye is setose (both apomorphies). The pronotum has a simple, median pronotal pit anteriorly and the collar lacks an anteromedian depression in the stangei group.

Pison agile and delicatum share a straight episternal sulcus, a completely punctate tegula, and have similar legs and antenna, but the setose eyes, lamelliform metapleural flange, and two submarginal cells are apomorphies of the agile group that separate it from the delicatum group. The occipital carina is a complete circle in the agile group.

#### Range:

Pison delicatum occurs from Colombia and Venezuela to northern Argentina and southern Brasil.

#### Types:

Holotype male: VENEZUELA, Zulia: Los Angeles del Tucuco, IV-15/16-1981, A. S. Menke and L. Hollenberg (USNM).

Paratypes (22 females, 20 males): COLOMBIA, Vaupés: Mitu, V-16-74, M. Cooper (BMNH); Meta: Cord. Macarena, II-15/28-76, M. Cooper (BMNH); Valle: Caula, VII-10-75, R. Wilkerson, malaise trap (CSDA), finca San Luis near Candelaria, IX-7/9-75, J. Lattke (CAS). VENEZUELA, Borburata, Car., III-15-40, P. Anduze (CU). ECUADOR, Napo: Coca on Río Napo, V-65, L. Peña (AMNH), Tena, XII-9/14-71, M. Cooper (BMNH), Limoncocha, VI-15/28-76, S. & J. Peck (CNC); Zamora-Chinchipe: Timbara, IV-4-65, L. Peña (AMNH). PERU, Cuzco: Quillabamba, XII-23/27-83, L. Huggert (PMA); Huanuco: Tingo Maria, VI-21-82, malaise trap, Wasbauer and Slansky (CSDA); Amazonas: Rodriquez de Mendoza, 1500 m, V-16-82, M. Cooper (COOPER); Junín: Valle Chanchamayo, 800 m., 1939, VIII-12-51, W. Weyrauch (LILLO), San Ramon, Valle Chanchamayo, 800 m., II-12-40, W. Weyrauch (AMNH). BOLIVIA, Beni: Río Itenez about 4 km. above Costa Marques (Brasil), IX-12/18-64, Bouseman and Lussenhop (AMNH); La Paz: Chulumani, 1700 m., IV-2-79, M. Cooper (BMNH); Coroico (BERLIN). PARAGUAY: San Pedro Cororo-Rio Ypane, XII-1/4-83, malaise trap, M. Wasbauer (CSDA); Rio Ypane, Cororo, XI-79, M. Fritz (FRITZ). ARGENTINA, Misiones: El Dorado, XII-70, Foerster (FRITZ); Cataratas del Iguazu, XI-5/9-70, Porter and Stange, (LILLO); Salta: Orán, Abra Grande, X-18/25-68, C. Porter (MCZ). BRASIL, Bahia: Itabuna, XI-15-82, II-21-83, F. P. Benton (BMNH); Sao Paulo: Ribeirão Prúto, X-10-65, R. Neilsen (UCD); Campinas, 1903, Hempel (VIENNA); Espirito Santo: Colatina, X-69, F. M. Oliveira (AEI).

Non-type material (one headless specimen): BRASIL, Para: Almeirim, XII-16-02, A. Ducke (VIENNA).

#### Etymology:

The name delicatum is the Latin word meanings delicate, soft, or tender.

### Agile Group (Figs. 77, 81-85)

#### Description:

Frons strongly swollen; face not broad, eye length slightly greater than distance between eye notches (fig. 77); labrum quadrangular, free margin entire; free margin of female clypeus with rounded median lobe whose edge is slightly thickened (fig. 77); female mandible with one inner tooth that is located slightly beyond midpoint; eye



densely covered with short setae; antenna clavate, outer flagellomeres broader than long; occipital carina a complete circle, narrowly separated from apex of hypostomal carina; pronotum with small, round anterodorsal pit but no lamella; scutal flange moderately broad; tegula completely punctate; scutellum bordered anterad by row of foveolae; propodeum punctate and with median longitudinal carina on dorsum but without lateral ridge at top of side; propleuron slightly gibbous posterolaterally, disk polished, impunctate; episternal sulcus straight, ending ventrad without curving forward; mesopleuron with subomaulus that often almost joins lower end of episternal sulcus; mesopleural sulcus paralleled anteriorly by row of foveolae; metapleural flange broadly lamelliform posteriorly (fig. 81); forewing media diverging after cu-a; forewing with two submarginal cells, second not petiolate, recurrent veins ending on submarginal cell I and II, respectively, or second interstitial between I-II; midcoxa bordered anterad by high ridge that is associated with precoxal sulcus; legs smooth, devoid of conspicuous spiniform setae at apices of tarsomeres; female foretrochanter without carina; hindcoxa with low inner carina dorsally, but without outer carina; hindtarsomere IV with very tiny plantula; tarsal claw thick to just before apex; tergum I simple apically; male sternum VIII narrow, entire or weakly indented at apex; genitalia laterally compressed, gonostyle simple but fringed ventrally with coarse, arcuate setae, volsellar lobes small, weakly setose.

Included species:

Pison agile in the North America, others (including agile) in the Oriental and Palearctic Regions: browni (Ashmead), differens Turner, hissaricum Gussakovskij, and possibly erythropus Kohl and rothneyi Cameron.

Discussion:

The following characterize the agile group, an Old World assemblage with one species adventive in North America: eyes setose, occipital carina complete, pronotum with only a small median pit anteriorly, subomaulus present, episternal sulcus straight, two submarginal cells, hindcoxal dorsum without an outer carina, and propodeum without ridge laterally. I have studied examples of browni and differens as well as agile. Although sternum VIII of the male is bluntly rounded with a slight indentation in agile (fig. 82), it can be narrower and more pointed as in browni from the Philippine Islands (see fig. 239 in Tsuneki, 1983).

Apomorphies of the agile group are the setose eyes, the clavate antenna, the two submarginal cells, the presence of a subomaulus, the straight episternal sulcus, the broad metapleural flange (fig. 81), and the form of the tarsal claws. The subomaulus is merely a short spur in browni.

Earlier I (Menke, 1968b) called this the koreense group but Krombein (1979) indicated that agile was a senior synonym of Radoszkowski's name.

Pison agile (Smith)  
(Figs. 77, 81-85)

Parapison agilis Smith, 1869:300. Holotype female: Ceylon (BMNH).

Paraceramius koreensis Radoszkowski, 1887:433. Holotype female: Korée (Mus. Kraków?)

Pison koreense, Krombein, 1958a:166. Adventive in North America (Illinois, Virginia).

Pison koreense, Krombein, 1958b:189. Catalog.

Paraceramius koreensis, Richards, 1962:118. Paraceramius preoccupied, Krombeinielleum proposed as replacement name.

Pison koreensis, Iwata, 1964:1. Biology.

Pison koreense, Krombein, 1967:394. Records from Maryland and Michigan.

Pison koreense, Menke, 1968a:3, 7. Taxonomy, listed.

Pison koreense, Menke, 1968b:1100, 1102. Taxonomy, keyed.

Pison koreense, Sheldon, 1968:107. Biology.

Pison koreense, Bohart and Menke, 1976:333, 337. Listed.



Pison agile, Krombein, 1979:1641. Synonymized koreense with agile, record from Kansas.

#### Discussion:

The following combination of characters separate agile from all other New World Pison: eye densely setose, metapleural flange broadly lamelliform (fig. 81), forewing with only two submarginal cells, propodeum without a dorsolateral ridge, and surface of tergum I dull in contrast to the shiny surface of II. Sternum VIII and the male genitalia are shown in figures 82–85.

This is the only Pison known in North America, and it is adventive from the Oriental Region (Krombein, 1958a). I have not studied the types of koreense or agile.

#### Biology:

Iwata (1964) reported on agile nests in Japan, and Sheldon (1968) observed the species in Illinois and described the biology in detail, including illustrations of the larva. Both authors used the name koreense. Iwata illustrated the cells of agile, and described them as "very thin and fragile" and said that "clearly [they] may be the .... most fragile mud cell[s] made by Japanese Aculeata." He said that a nest (16 studied) consisted of one to 21 separate but contiguous cells arranged irregularly (average number of cells/nest = 7.6). They were glued to vertical protected surfaces, and the exterior surface had a "ripple relief." Iwata found 6 immature spiders of the genus Araneus in one cell.

Sheldon reported that agile made its nests in sheltered situations also, and even used empty cells of Trypoxylon politum (Say) nests. One to 12 fragile cells, arranged randomly, made up a nest. Adult spiders of the genus Dictyna representing two species, were the prey found in four cells, but immatures of the same genus were also provisioned. The average number of spiders per cell was 25.2. Sheldon stated that the female carried the paralyzed spider in her mandibles. The wasp egg was laid on the last spider provisioned. The eulophid parasitoid Melittobia chalybii Ashmead was reared from one cocoon of agile that Sheldon found in an unsealed cell of Trypoxylon politum (Iwata found no parasitoids in his observations).

#### Range:

Apparently widespread in the Oriental Region (Sri Lanka, India) and eastern Asia (China, Japan, Korea). In North America agile is known from Kansas, Illinois, Michigan, New York, Maryland, and Virginia.

#### Material examined (12 specimens):

ILLINOIS: Palisades Park (USNM); Kickapoo State Park (USNM). MICHIGAN: Gun Lake Mal. Tr. (BMNH). NEW YORK: Ithaca (CU); Lewisboro (AMNH). VIRGINIA: McLean (USNM, BMNH).

#### Stangei Group (Figs. 9, 12, 78, 86–108)

#### Description:

Scape, mandible, mouthparts, and most of fore and mid legs yellowish brown. Body devoid of erect setae; frons not swollen; face not broad, eye length greater than distance between eye notches; free margin of labrum arcuate or quadrangular; female clypeus not double-edged but margin sometimes thickened, a median lobe weakly or not differentiated; male clypeus tridentate, thickened; female mandible with one inner subapical or median tooth or simple; eye densely covered with short setae; antenna clavate, outer flagellomeres broader than long; occipital carina usually incomplete below, ending just before reaching midventral line, occasionally a complete circle narrowly separated from apex of hypostomal carina; pronotum with small round or transversely elongate pit anterodorsally; pronotal collar without anteromedian depression but sometimes with obliquely transverse ridge; scutal flange



narrow, upturned; parapsidal lines sulciform in female; tegula completely micropunctate; scutellum margined anteriorly by row of contiguous foveolae; propodeal side delimited dorsad by crenulate ridge that extends from petiole socket area to spiracle; propleuron punctate, with gibbosity posterolaterally; episternal sulcus curving forward ventrally, attaining anterior margin of mesopleuron but often weakly impressed there; mesopleural sulcus paralleled anteriorly by row of foveolae; metapleural flange narrow; forewing media diverging after cu-a; forewing with two submarginal cells (three in rare exceptions, figs. 87-88), II not petiolate in two-celled wing (figs. 12, 86); both recurrent veins ending on submarginal cell I, or second interstitial between I-II, or ending on II; midcoxal cavity bordered anterad by high ridge associated with precoxal sulcus; legs smooth, devoid of conspicuous spiniform setae at apices of tarsomeres; tarsomeres apparently without plantulae; tarsal claw thick to just before apex; female foretrochanter not carinate ventrally; dorsum of hindcoxa with low or very weak inner carina and no outer carina or only an apical vestige; apical rim of tergum I simple; male sternum VIII narrow, apex truncate or with shallow emargination; gonostyle of male genitalia long, slender, simple, setose ventrally, volsellar lobes small, aedeagus without ventral spine.

Included species:

Pison abathes, duckei, plaumanni and stangei.

Discussion:

The following characterize the stangei group: eye densely setose (fig. 9), pronotum with small median pit anteriorly (fig. 95), episternal sulcus complete, forewing usually with only two submarginal cells (but see below), and propodeum with dorsolateral ridge. In this assemblage the true second submarginal cell has been reduced to the point of disappearing, but in one male a tiny second submarginal is present in both wings (figs. 87-88). The eye notch is unusually shallow in one species, abathes. Members of the stangei group are among the smallest species of Pison known.

Apomorphies of the group include the setose eyes, the clavate antenna, the form of the tarsal claws, the two submarginal cells, and lateral propodeal ridge.

In terms of species discrimination, the stangei group is the one of the most vexing assemblages in the New World fauna. More material has been available than when I first treated the group (Menke, 1968b), but differences between stangei and duckei are still not as precise as one would like, and the male of the latter is still unknown. Pison plaumanni remains the most distinctive species and its male is now known. One new species has been discovered. Finally a male from Ecuador (AMNH) has three submarginal cells, the second represented in each forewing by a much reduced cell (figs. 87-88). The wing condition of this specimen may be a freak occurrence, but in any case it is probably an undescribed species. The male genitalia are fairly similar in plaumanni, stangei and the specimen with three submarginal cells.

Pison plaumanni Menke  
(Figs. 9, 12, 89-90, 95, 101-104)

Pison plaumanni Menke, 1968b:1105. Holotype female: Nova Teutonia, Santa Catarina, Brasil (UCD).

Description:

Pedicel, basal part of flagellum, and clypeal margin often yellowish brown. Female clypeus with weakly defined lobe: it is thickened, truncate, and its edge has a transverse dimple (fig. 89; the clypeal outline in Menke, 1968b, fig. 7, is inaccurate). Male clypeus as in fig. 90. UID 0.68-0.69X distance between the eye notches in females, 0.72X in males. LID 0.69-0.71X UID in females, 0.63-0.66X in males. Ocellocular distance greater than other species of stangei group (OOD 1.38-1.65X HOD). Occipital carina broadly interrupted ventrad in comparison with other species, gap equal to length of foretarsomere I or only slightly shorter (17:20). Anterodorsal



pronotal pit circular to transverse, usually margined posterad by carina. Pronotal collar rounded laterally, no trace of transverse ridge or humeral angle (fig. 95). Disk of propodeal dorsum smooth, punctate, with median longitudinal carina that is often in depression; carina usually reaches propodeal apex or nearly so, and frequently many short cross-carinae associated with it. Propodeal hindface varies from punctate to transversely ridged and punctate. Propodeal side smooth, punctate, without ridges except sometimes just beneath spiracle. Second recurrent vein interstitial between submarginal cells I-II, or ending just inside I. Male sternum VIII slightly emarginate at apex, lateral margins parallel or slightly diverging basad (fig. 104). Male genitalia similar to stangei but aedeagus without midventral ridge (fig. 102).

Length 5-6.5 mm.

#### Discussion:

This is the largest species in the stangei group. The broad ocellocular distance, the rounded humerus of the pronotal collar (and absence of an oblique ridge), and smooth propodeal dorsum and side are the most diagnostic features. The eighth sternum of the male is not constricted before the apex in contrast to that of stangei.

I have examined two females from Mocoa, Putumayo, Colombia (BMNH) that resemble plaumanni in the clypeus, the broadly interrupted occipital carina, the rounded humerus of the pronotal collar, the propodeal sculpture, and body size. However, the ocellocular distance is only slightly greater than an ocellus diameter (OOD 1.11-1.14X HOD), the LID is 0.76-0.78X the UID, and the UID is only 0.61-0.62X the distance between the eye notches. Thus these specimens may represent an undescribed species.

#### Range:

Pison plaumanni is known only from eastern and southeastern Brasil.

#### Material examined (26 females, 12 males):

BRASIL, Bahia: Itabuna, VIII-7-83, III-18-84, F. Benton (BMNH); Aguas Vermelhas, XII-83, M. Alvarenga (AEI). Sao Paulo: Sao Paulo, various dates, V. Alin (MLSU). Santa Catarina: Nova Teutonia, various dates, F. Plaumann (UCD, MCZ, USNM, BMNH). "Brazilia", 1886 (USNM).

#### Pison stangei Menke (Figs. 86, 91-92, 94, 96, 105-108)

Pison stangei Menke, 1968b:1102. Holotype male: Amaicha, Tucuman, Argentina (LILLO).

#### Description:

Antenna and fore and midlegs occasionally entirely or largely black. Female clypeus with prominent median lobe the edge of which is variably thickened (fig. 91). Male clypeus as in fig. 92. UID 0.59-0.62X the distance between eye notches in females; 0.62-0.64 in males. LID 0.74-0.81X UID in females, 0.76-0.79X in males. OOD 1.08-1.27X HOD. Occipital carina often a complete circle narrowly separated from apex of hypostomal carina, but sometimes weakly complete or narrowly incomplete at midventral line. Anterodorsal pronotal pit circular, not margined posterad by carina. Pronotal collar rounded laterally although weak transverse ridge present (figs. 94, 96). Propodeal dorsum with median carina that fades posterad, usually ending well before apex; disk of dorsum variably sculptured: coarsely to finely obliquely ridged or striatopunctate, or ridging becoming transverse on apical half to two-thirds, or surface obscurely striatopunctate, or even mostly just punctate. Propodeal hindface transversely ridged, ridges sometimes evanescent laterad. Propodeal side obliquely or horizontally ridged above, punctate below. Second recurrent vein ending on submarginal cell I or sometimes interstitial between I-II. Male sternum VIII slightly concave at apex, lateral margins slightly constricted



subapically (fig. 108). Male genitalia as in figs. 105–107, aedeagus with midventral ridge (figs. 105–106).

Length 4.5–6 mm.

#### Discussion:

The rounded humerus of the pronotal collar and the fine ridges on the upper half of the propodeal side are the most obvious diagnostic features of stangei. The weak transverse ridge on the collar (fig. 96) is a condition intermediate between plaumanni, which has none (fig. 95), and duckei and abathes, both of which have a well developed oblique ridge (figs. 97, 99). Except for the difference in the collar, stangei is similar to duckei, and their head measurements are essentially identical. The occipital carina is often a complete circle in stangei, but it is always interrupted in duckei. When I described stangei (Menke, 1968b), I used the ridging of the propodeal dorsum as a diagnostic feature for separation from duckei, the latter having a mostly punctate dorsum. But the sculpture of the dorsum varies considerably in stangei, some specimens being mostly punctate and therefore similar to duckei. Thus propodeal sculpture is not reliable for separating these two species.

#### Range:

Pison stangei is known only from northwestern Argentina and Bolivia.

#### Material examined (14 females, 4 males):

BOLIVIA, Tarija?: Las Carreras, I-4-56 (KU). ARGENTINA, Salta: Rosario de Lerma, XI-10/18-83, M. Wasbauer (CSDA), Pocitos, I-1971, M. Fritz, Martinez and Fritz (USNM). Tucuman: Horco Molle, Parque Sierra San Javier, 700 m, various dates, L. A. Stange (LILLO), Jardin del Lillo, IX-19-67, C. Porter (MCZ), Tucuman, XI-24-65, L. A. Stange (LILLO); Santiago del Estero: Suncho Corral, XII-28-75, L. Stange (LILLO).

#### Pison dücke Menke (Figs. 97–98)

Pison dücke Menke, 1968b:1103. Holotype female: Pará, Brasil (VIENNA).

#### Description (female only):

Pedicle and flagellomere I usually yellowish, clypeal margin yellowish in type, hindleg largely yellowish brown in material from Trinidad, midleg black above in specimen from Brasilia. Clypeus with prominent median lobe whose edge is thickened (similar to stangei). UID 0.60–0.66X distance between eye notches. LID 0.70–0.79X UID. OOD 1.1–1.31X HOD. Occipital carina interrupted ventrad. Anterodorsal pronotal pit circular, margined posterad by short carina. Pronotal collar with oblique, transverse ridge that makes humerus angulate when viewed from above (figs. 97–98). Propodeal dorsum punctate, with median longitudinal carina that ends at middle or slightly beyond, many short cross-carinulae associated with median carina, base of dorsum with up to 10 oblique carinae that only rarely extend onto disk (one Trinidad specimen); hindface with fine cross-carinulae that become evanescent dorsad; propodeal side variable: sometimes with several horizontal ridges only beneath spiracle, sometimes upper area more extensively ridged. Both recurrent veins ending on first submarginal cell.

Length 4–4.5 mm.

#### Discussion:

Pison dücke is similar to stangei. The essential features of duckei for separation from stangei are: pronotal collar with obvious oblique transverse ridge that makes humerus clearly angulate (fig. 97), occipital carina interrupted, and propodeal dorsum mostly punctate. The degree of the pronotal angulation varies however, and the punctate propodeal dorsum is approached by some specimens of



stangei. The sculpture of the propodeal side is often similar between the two species.

The male of duckei is unknown. The male with three submarginal cells discussed under the stangei species group is not the unknown male of duckei, although its head measurements fall within the range of the species. The sculpture of its propodeal dorsum is more like stangei, the humerus of the pronotal collar is not angulate, and of course the wing has three submarginal cells.

Range:

Pison duckei is known from scattered localities between Panama and central Brasil.

Material examined (11 females):

PANAMA: Las Cumbres, XII-8/28-82, H. Wolda (PMA). COLOMBIA, Tolima: Armero, I-30/II-5-77, E. L. Peyton (USNM). VENEZUELA, Guarico: Hato Masaguaral, 44 km s Calabozo, 5-3/10-85, Menke & Carpenter (USNM). TRINIDAD: St. Augustine, various dates, E. Callan, J. Noyes (BMNH). BRASIL, Pará: Pará (Belém), I-18-01, A. Ducke (holotype) (VIENNA); Federal District: Brasília, Lago Sul, III-7-77, A. Raw (BMNH).

Pison abathes Menke, new species  
(Figs. 78, 93, 99-100)

Description, holotype female:

Black, following yellow brown: palpi, mandible, labrum, clypeal margin, scape and pedicel beneath, margin of pronotal lobe, fore and midlegs except coxae, and hindtrochanter.

Labrum trapezoidal in shape, shallowly concave (fig. 93); clypeus with arcuate median lobe whose margin is slightly thickened; eye notches shallow (fig. 78), UID 0.8X distance between eye notches; LID 0.68X UID; OOD 1.27X HOD; occipital carina complete but weak opposite apex of hypostomal carina and separated from latter; anterodorsal pit of pronotum circular, smaller than hindocellus; collar with oblique, transverse ridge that makes humerus angulate in dorsal view (figs. 99-100); scutum, scutellum and metanotum weakly shining, finely, nearly contiguously punctate, punctures largest on scutum; propodeal dorsum shiny, with about 8 short, coarse carinae at base, middle one extending only about one-third distance to apex, disk of dorsum irregularly transversely carinulate changing to punctation laterally, apex of dorsum delimited from hindface by short carina; hindface shiny, with coarse cross-ridges; propodeal side longitudinally carinulate on upper one-fifth, remainder punctate; both recurrent veins ending on submarginal cell I.

Length 4.5 mm.

Variation in females (3 specimens):

Clypeus completely black (Bolivia), hindfemur yellow brown (Bolivia, Guyana). Edge of clypeal lobe not thickened (Bolivia, Guyana). UID 0.76-0.78X distance between eye notches; LID 0.67-0.70X UID. OOD 1.13-1.27X HOD. Propodeal dorsum largely punctate in Bolivian specimen, median carina extending half distance to apex, the latter without transverse carina; dorsum in Guyana specimen more like holotype but median carina almost reaching apex, the latter with only suggestion of a transverse carina. Propodeal side with only two carinulae just beneath spiracle (Bolivia, Guyana). Second recurrent vein interstitial in one wing of Guyana paratype. Length 4-4.5 mm.

Male:

Unknown.



Discussion:

The shallow eye notches, angulate pronotal humerus, and trapezoidal labrum are the salient features of abathes. The variation seen in the sculpture of the propodeal dorsum is disconcerting and it may be that the Bolivia and Guyana material is not conspecific with the Ecuadorian females. However, there is also considerable variation in the propodeal sculpture of stangei. It is possible also that the shallow eye notches of abathes simply represent extreme variation of duckei, the only other species with angular pronotal humeri. But lacking intergrades I have decided to treat these specimens as a new species.

Range:

Ecuador, Bolivia and Guyana.

Types:

Holotype female: ECUADOR, Pichincha: Río Palanque Res. Sta., II-1983, malaise trap, Sharkey and Masner (PMA).

Paratypes (three females): ECUADOR, same data as type (PMA). BOLIVIA, Santa Cruz: Río Mamore, 2 km n mouth of Rio Chapare, VII-31-65, J. Bouseman (AMNH). GUYANA: Mazaruni, clearing, in colony house, VIII-26-37, O. Richards (BMNH).

Etymology:

The name abathes is a Greek word that means shallow, a reference to the distinctive eye notches of this species.

Krombeini Group  
(Figs. 79-80, 109-116)

Description:

Frons not strongly swollen; face broad, eye length about 10% shorter than distance between eye notches (figs. 79-80); labrum transverse, hidden, free margin arcuate or obtusely triangular, entire; free margin of female clypeus not thickened or double-edged, outline a low obtuse triangle or with median lobe; female mandible with subapical inner tooth; occipital carina a complete circle, broadly contiguous with apex of hypostomal carina; eye densely covered with short setae; antenna clavate, outer flagellomeres broader than long; anterior edge of pronotum with broad, thin, setose lamella that extends laterad to level of pronotal lobe; pronotum without anterodorsal pit; scutal flange broad, upturned; tegula evenly punctate; scutellum with unpitted narrow sulcus anteriorly; propodeum punctate, with median longitudinal carina on dorsum but without lateral ridge, hindface without cross-ridges; propleuron with short, high lamelliform projection posterolaterally; episternal sulcus curving forward ventrally, attaining anterior margin of mesopleuron; mesopleural sulcus paralleled by series of foveolae; forewing media diverging after cu-a; forewing with three submarginal cells, II receiving both recurrent veins; midcoxal cavity delimited anterad by high ridge associated with precoxal sulcus; legs smooth, devoid of conspicuous spiniform setae at apices of tarsomeres; female foretrochanter with carina ventrally; outer dorsal carina of hindcoxa represented by high apical lamella; tarsi without plantulae; tarsal claw thick to just before apex; tergum I with reflexed apical rim that is lamelliform; male sternum VIII semicircularly emarginate apically, flanked by two prongs (fig. 110); male genitalia as in figs. 113-116, gonostyle setose, with narrow, ventral, subapical lobe (fig. 115); volsellar lobes large, setose apically; aedeagal head with ventral process (see fig. 13 in Menke, 1968b).

Included species:

Pison krombeini and neotropicum.



Discussion:

The following define the krombeini group: face broad, eye setose, occipital carina complete, pronotum with setose lamella along anterior margin, propodeum without ridge laterally, forewing with three submarginal cells, tegula entirely punctate, tergum I apex reflexed, and male sternum VIII emarginate, bounded by prongs. The tergal character needs some elaboration. The lamella-like apical margin of tergum I is not the real rim. The true edge of the tergum can be seen beneath this broad, upturned flange – thus, tergum I is really double-edged. Earlier I (Menke, 1968b) described the female mandible as having two subapical teeth, but there is only one tooth in krombeini, and only a suggestion of a second subapical tooth in neotropicum.

Apomorphies of the group are the broad face, the setose eye, the pronotal lamella, the carinate female foretrochanter, the reflexed and double-edged margin of tergum I, and the two prongs at the apex of male sternum VIII. A similar but asetose pronotal lamella also occurs in the pilosum group. The male of krombeini has transverse depressions on sterna III–IV, but the male of neotropicum is unknown; thus, at present, it is impossible to list this specialization as an additional apomorphy for the group.

Because I described both species earlier (Menke, 1968b), I am presenting only brief diagnoses and distribution records here.

Pison krombeini Menke  
(Figs. 79, 109–110, 112–116)

Pison krombeini Menke, 1968b:1105. Holotype male: British Honduras (= Belize) (USNM).

Diagnosis:

The dense metallic setae of the propodeal dorsum and hindface is the most obvious recognition feature. The female clypeus (fig. 109) differs from that of neotropicum (fig. 111). The thorax is shiny, the pronotal collar has a prominent ridge anterolaterally, and the parapsidal and admedian lines of the scutum are deeply impressed. The metapleural flange is narrow. Terga I–II have broad silver or golden apical fasciae, and sternum I has appressed silver setae that are directed basad. The forewing has a cloud at the apex of the first submarginal cell and the leading edge of the wing is faintly infumate. The inner and outer veinlets of submarginal cell III are separated on the marginal cell by an ocellus diameter or less, sometimes joining there, or even forming a petiole. The depressions on male sterna III–IV are presumably diagnostic also (fig. 112). The aedeagus has a large ventral prong (not visible in figs.), the apices of the two penis valves curl away from each other (figs. 114–115), and the gonostyle has a curled fingerlike process on its inner, ventral margin near the apex (figs. 114–115). Length 6–7.5 mm.

Range:

Southern Mexico to Colombia.

Material examined (13 females, 3 males):

MEXICO, Vera Cruz: Cordoba (GENEVA); Tabasco: Teapa, March, H. H. Smith (BMNH); Yucatan: Chichen Itza, VII–20–52, J. & D. Pallister (AMNH). BELIZE: "British Honduras", I–08 (USNM). GUATEMALA: El Salto, Escuintla, VI–28–34, F. X. Williams (BPBM), Helvetia, San Sebastian, IV–21/22–31, J. Bequaert ((MCZ), Sta. Emilia, Pochuta, II/III–31, J. Bequaert (MCZ). COSTA RICA, Santa Rosa Park, II–13–78, D. Janzen (AEI). PANAMA: Barro Colorado I., VIII–15/IX–26–28, P. Rau (note 7756) (USNM). COLOMBIA, Arauca: Tame, VII–8/17–76, M. Cooper (BMNH); Magdalena: Rio Frio, VII–13–27, G. Salt (BMNH); Valle: Cali and vic., 3–4000 feet, I–8/20–72, H. Evans (MCZ).



Pison neotropicum Menke  
(Figs. 80, 111)

Pison neotropicum Menke, 1968b:1106. Holotype female: Rio de Janeiro, Brasil (USNM).

Diagnosis (male unknown):

Distinctive features of neotropicum are the shape of the female clypeus (fig. 111), the dull thoracic dorsum, absence of appressed metallic setae on the propodeal hindface and apex of the dorsum, absence of silver setae on sternum I and absence of metallic fasciae on terga I-II. The collar has a transverse ridge anteriorly, but it is not prominent laterally. The admedian and parapsidal lines of the scutum are not depressed. The metapleural flange is about as broad as an ocellus diameter. The leading edge of the forewing is moderately infumate, and the inner and outer veinlets of submarginal cell III are widely separated on the marginal cell. Length 8.5 mm.

No additional material has been found since the species was described.

Range:

Known only from southeastern Brasil.

Material examined (6 females):

BRASIL, Guanabara: Rio de Janeiro, X-38/I-39, R. C. Shannon (USNM, UCD).

Euryops Group  
(Figs. 11, 117-130)

Description:

Frons not swollen; face broad, eye length 10-20% shorter than distance between eye notches (fig. 117, 119); female clypeus with roundly truncate median lobe, its apex with lower lip of variable shape; male clypeus with sharp, triangular median lobe; female mandible with cleft near middle of inner margin, but no tooth; labrum with deep, U-shaped emargination resulting in two apical, setose, fingerlike lobes; occipital carina joining apex of hypostomal carina; pronotum without anterodorsal lamella or pit; lateral margin of scutum a broad upturned flange; tegula uniformly punctate; scutal flange broad; propodeal dorsum without median longitudinal carina; propodeal side with crenulate ridge that extends from petiole socket nearly to spiracle; disk of propleuron largely impunctate, shiny; lower end of episternal sulcus curving forward ventrally, usually attaining anterior margin of mesopleuron; dorsum of hindcoxa with strong inner carina, but outer carina reduced to short evanescent distal ridge; forewing media diverging from M+Cu after crossvein cu-a although sometimes nearly interstitial; forewing usually with three submarginal cells, rarely two (fig. 11); tergum I narrowly double-edged apically; male sternum VIII with broad, shallow emargination apically; male genitalia laterally compressed, aedeagus with broad, apically rounded, laterally compressed head whose ventral margin has a hooklike angle (not visible in SEM photo, figs. 128-130), volsellar lobes slender, acuminate, apical half of gonostyle narrow, setose ventrally (figs. 128-129).

Included species:

Pison eu, euryops, lillo, and styphopteron.

Discussion:

The following define the euryops group, one of the most distinctive in the New World fauna: face broad, labrum with U-shaped emargination, pronotum without anterodorsal pit, propleuron largely impunctate, tegula completely punctate, and tergum I double-edged. The broad face, labral form and double-edged tergum are apomorphies. The labral and tergal character states also occur in the pilosum group but neither is universal there.

Members of the euryops group have very similar sculpture and vestiture. Species



differences are found mainly in clypeal shape, facial proportions, flagellar features, and sculpture of the propodeal hindface. The loss of the second submarginal cell in one species, styphopteron, appears to be a consistent feature, but only three specimens are known. The genitalia display relatively minor differences between the four species, but insufficient male material of lillo, styphopteron and eu has hampered assessment of their usefulness in species discrimination. The asymmetrically swollen flagellomeres in males of euryps are distinctive, but the few males available of the other species does not permit positive conclusions on the reliability of the apparent antennal differences observed.

Pison eu Menke, n. sp.  
(Figs. 117-118, 121, 128-130)

Description, holotype female:

Black; wings clear except for cloud over submarginal cell II. Clypeus and lower half of frons with dense, appressed, silver setae that obscure sculpture; terga I-II with silver apical fasciae that are interrupted at middle; erect setae of body pale, longest on metanotum and propodeum.

Clypeal lobe arcuate, its lower lip with broad, shallow emargination (similar to fig. 118). Frons shiny, finely, densely punctate (punctures 1 diameter apart or less); eye length 0.88X distance between eye notches; UID 0.77X LID. OOD 0.85X HOD. Flagellomere I length 3.5X apical width, remaining flagellomeres progressively shorter.

Thorax shiny, scutum and scutellum very finely punctate, punctures sparser than those of frons (1-4 diameters apart); metanotum impunctate; propodeal dorsum largely smooth but disk with sparse, pinprick punctures that become denser peripherally and along midline; propodeal hindface with several transverse ridges just above petiole socket, upper part of hindface smooth, with scattered pinprick punctures; propodeal side smooth, uniformly covered with pinprick punctures (several diameters apart). Mesopleuron smooth, densely punctate, punctures 1-2 diameters apart anteriorly and about same size as those on scutum, becoming sparser, finer toward mesopleural sulcus; row of foveolae along lower half of mesopleural sulcus. Metapleuron same as propodeal side.

Forewing with three submarginal cells, recurrent vein I ending on submarginal cell II, recurrent vein II ending on submarginal cell III (nearly interstitial in right wing).

Tergum I with fine pinprick punctures similar to those on propodeal dorsum; II more densely punctate.

Length 7.5 mm.

Variation in females (15 specimens):

Lower clypeal lip not indented in single specimen from Oaxaca. UID 0.76-0.80X LID. Punctuation varies in coarseness from specimen to specimen. Tergum III sometimes has apical fascia. Recurrent vein II is interstitial between submarginal cells II and III in eleven specimens. Occasionally forewing uniformly but weakly infumate. Length up to 9.5 mm.

Male (2 specimens):

As in female except: mandible as in fig. 121; clypeal lobe as in fig. 121. UID 0.93-0.95X LID; OOD = HOD in Peruvian specimen. Flagellomeres VI-VII each with weak linear tylus (Venezuelan specimen) or narrowly linear shiny area (Peruvian specimen). Genitalia as in figs. 128-130. Length 6.5 mm.

Discussion:

The female clypeal lobe and the shape of its lower lip are immediately diagnostic in that sex (fig. 118). The non-ridged upper part of the propodeal hindface is also distinctive in both sexes, although styphopteron is similar. The latter species,



however, has only two submarginal cells and other differences. The upper interocular distance is  $0.73\text{--}0.80\times$  the lower interocular distance in females of styphopteron and eu. In euryps the UID and LID are essentially equal. Flagellomere I is more than  $3\times$  as long as wide in females of eu and usually slightly less than  $3\times$  as long as wide in euryps. This flagellomere is about  $4\times$  as long as wide in females of styphopteron.

The difference in the flagellum of the two males is disconcerting, but no other differences between them are apparent, and I am assuming that they are conspecific.

Range:

Pison eu occurs from southern Mexico to southern Peru and eastward to Suriname, but I have no records from the Amazon basin proper.

Types:

Holotype female: COLOMBIA, Narino: Barbacoas, IV-2-1974, M. Cooper (BMNH).

Paratypes (17 specimens): MEXICO, Oaxaca, 44 mi. w Tehuantepec, VII-21-52, ♀, Gilbert and MacNeil (UCD). HONDURAS: La Ceiba, ♀, F. J. Dyer (USNM). COSTA RICA, Guanacaste: Santa Rosa Park, VII-15-77, ♀, D. H. Janzen (AEI); La Selva Res. Sta., VI-11/17-86, ♀, Hanson and Bohart (USU). COLOMBIA, Meta: Restrepo, VI-18-74, ♀, L. A. Stange (LILLO); Río Duda, III-8/12-76, ♀, M. Cooper (BMNH); Arauca: Tame, VII-1/7-76, ♀, M. Cooper (BMNH); Putumayo: Villa Garzon, 400-550 m, XII-25-87, ♀, M. Cooper (COOPER). PERU, Huanuco: Tingo Maria, VI-23-82, ♂, malaise trap, Wasbauer and Slansky (CSDA); Cuzco: Quincemil, 750 m, X-16/31-62, ♀, L. Peña (MCZ). VENEZUELA, Aragua: El Limón, 480 m, IV-24/29-V-1-73, ♂, 2♀, malaise trap, C. Rosales (UCM). GUYANA: Essequibo River, Moraballi Creek, X-8-29, 2♀ (BMNH). SURINAME: Paramaribo, VII-20-60, XI-22-57, 2♀, P. v. Doesburg (LEIDEN).

Etymology:

The name eu, treated as a noun in apposition, is based on the Greek prefix meaning true or good, a reference to the fact that the species is valid.

Pison euryops Menke, n. sp.  
(Figs. 119-120, 122, 126-127)

Description, holotype female:

Same as described for eu except: forewing lightly infumate except for clear spot at submarginal cell III; terga I-II with broadly interrupted fascia; clypeal lobe roundly trapeziform, its lower lip arcuate (similar to fig. 120); eye length  $0.80\times$  distance between eye notches; UID essentially equal to LID; OOD  $1.31\times$  HOD; flagellomere I length less than  $3\times$  apical width ( $19.5:7.5$ ); punctures of scutum and scutellum 1 to 2 diameters apart, metanotum with sparse pinprick punctures; propodeal dorsum punctures slightly larger than those on scutum, 1 to 2 diameters apart; propodeal hindface completely covered by coarse, transverse ridges; second recurrent vein interstitial between submarginal cells II and III; tergum I with punctation similar to scutum.

Length 8 mm.

Variation in females (15 specimens):

Eye length up to  $0.87\times$  distance between eye notches. OOD usually  $1.25\times$  HOD, but OOD = HOD in one specimen from Guanabara. Thoracic punctation varies in degree of coarseness from specimen to specimen. Recurrent vein I occasionally interstitial between submarginal cells I-II. Length 6.5-9 mm.

Male (9 specimens):

As in female except: inner margin of mandible sinuate (fig. 122); clypeal lobe a simple triangle, sides straight (fig. 122); LID  $0.83\text{--}0.95\times$  UID; OOD  $1.33\times$  HOD or slightly more; flagellomeres III-VI with linear, asetose, shiny areas ventrally (fig.



127), IV–VII or VIII swollen toward apex in profile, V–VI most strongly so (fig. 126); second submarginal cell greatly reduced in two specimens from Argentina (smaller than ocellus, absent in one wing of one specimen); first recurrent vein ending most commonly on submarginal cell II, but sometimes interstitial or ending on I, second recurrent vein usually interstitial but sometimes ending on submarginal II or III; genitalia similar to eu. Length 6–7.5 mm.

#### Discussion:

The arcuate shape of the lower lip of the female clypeal lobe (fig. 120), and the asymmetrically swollen flagellomeres of the male antenna (fig. 126) are diagnostic for euryps. The completely ridged propodeal hindface is an additional character that is shared only with lillo. Females of euryps differ from eu and styphopteron in the essentially equal lower and upper interocular distances.

The reduction of the second submarginal cell in the males from Argentina does not occur in the single female known from that country.

#### Range:

Pison euryops is known from Colombia, central and southern Brasil and northern Argentina.

#### Types:

Holotype female: BRASIL, Santa Catarina: Nova Teutonia, XI-13-1961, ♀, F. Plaumann (MCZ).

Paratypes (24 specimens): COLOMBIA, Meta: Cord. Macarena, II-15/29-76, ♀, M. Cooper (BMNH). BRASIL, Distrito Federal: Res. Ecol. IBGE, various dates 1981-82, 4 ♂, 3 ♀, (IBGE); Guanabara: Represa Rio Grande, VI-67, ♀, M. Alvarenga (AEI); Rio de Janeiro, IX-38, ♀, R. C. Shannon, (USNM); Santa Catarina: Nova Teutonia, various dates, 7 ♀, 3♂, F. Plaumann (MCZ, UCD, LACM, KU, OSU); Corupa, XII-40, ♀, A. Maller (AMNH). ARGENTINA, Entre Rios: Salto Grande, Concordia, IX-64, ♀ (GEMBLoux); Misiones: Puerto Rico, XI-5/13-70, ♂, Porter & Stange (LILLO); Dos de Mayo, XII-73, ♂, M. Fritz (FRITZ).

#### Etymology:

The name euryps is based on the Greek words eurys (= broad) and ops (= face), and is a reference to the broad head.

### Pison lillo Menke, n. sp.

#### Description, holotype male:

Black; mandible, tegula and tarsi brown; wings clear; clypeus and lower half of frons densely covered by pale, gold, appressed setae that obscure sculpture; setae of thorax and gaster pale; terga I–II with broadly interrupted fasciae.

Mandible and clypeal lobe same as euryps; frons weakly shiny, finely, densely punctate, punctures about one diameter apart; eye length 0.82X distance between eye notches; LID 0.90X UID; OOD 1.55X HOD; flagellomere I length slightly less than 3X apical width, III–VI with narrow, asetose shiny areas ventrally, that on III elevated as a tylus, V–VI not asymmetrically swollen (flagellomeres X–XI missing on left antenna, III–XI missing on right antenna).

Thorax shiny, punctation similar to euryps and eu, propodeal hindface completely covered by coarse, transverse ridges.

Forewing with three submarginal cells, recurrent vein I ending on I, recurrent vein II ending on III, but both nearly interstitial.

Genitalia similar to eu.

Length 7 mm.

#### Female:

Unknown.



Discussion:

Pison lillo is known from a single male that is similar to euryps, differing mainly in having non-swollen flagellomeres. Both species have similar facial measurements and have ridges to the top of the propodeal hindface.

Range:

Known only from northern Argentina.

Type:

Holotype male: ARGENTINA, Tucuman: Trancas, Tacanas, III-3-1948, R. Golbach (LILLO).

Etymology:

The name lillo, a noun in apposition, is a dedication to the Instituto Miguel Lillo.

Pison styphopteron Menke, n. sp.  
(Figs. 11, 123-125)

Description, holotype female:

Black; wings clear; clypeus and lower half of frons with dense, appressed silver setae that obscure sculpture; terga I-II with broadly interrupted tarnished silver fasciae; erect setae of body pale, longest on metanotum and propodeum.

Clypeal lobe reflexed, quadrangular, corner rounded, lower lip triangular, tip rounded (similar to fig. 124). Frons shiny, punctate, punctures one to two diameters apart; eye length 0.89X distance between eye notches; UID 0.73X LID; OOD 0.60X HOD. Flagellomere I length slightly more than 4X apical width, remaining articles progressively shorter.

Thorax shiny, scutal punctures similar to frons, one to three diameters apart, scutellum strongly gibbous and more sparsely punctate than scutum, metanotum very finely punctate; propodeal dorsum and upper half of hindface smooth, very finely, sparsely punctate, lower part of hindface with several transverse ridges; propodeal side smooth, sparsely, finely punctate. Mesopleuron smooth, punctures similar to those on scutum but sparser, finer, toward mesopleural sulcus; row of foveolae along lower half of mesopleural sulcus. Metapleuron with fine, pinprick punctation.

Forewing with two submarginal cells via fusion of II and III, outer veinlet of submarginal cell I angled, appendiculate (fig. 11); first recurrent vein interstitial in right wing, ending on submarginal II in left wing.

Tergum I more sparsely punctate than II.

Length 7 mm.

Variation in females (1 specimen):

Eye length 0.85X distance between eye notches; OOD slightly more than 0.75X HOD; flagellomere I length almost 4X apical width. Scutellum with median longitudinal impression. Propodeal hindface with traces of cross-ridging on upper half. Outer veinlet of submarginal cell I not appendiculate, recurrent vein I ending on submarginal cell II. Length 8.5 mm.

Male (1 specimen):

As in female except: inner margin of mandible a simple arc (fig. 123); clypeal lobe as in fig. 123. Eye length 0.91X distance between eye notches; UID 0.93X LID; OOD 0.90X HOD; flagellomere I length slightly less than 3X apical width; flagellomeres simple. Thorax as described for holotype. Genitalia similar to eu but gonostyle apex comparatively narrower dorsoventrally and apical margin of aedeagus angled. Length 5.5 mm.

Discussion:

The presence of only two submarginal cells and the angled outer veinlet of



submarginal cell I are unique features of styphopteron. The shape of the female clypeal lobe and lip are distinctive (figs. 124–125), as is the arcuate cutting edge of the male mandible and simple male flagellum. All species of the euryps group have a gibbous scutellum but it is most strongly swollen in females of styphopteron. This is a difficult character to use because it is a matter of degree and there is variation in the two females available.

Range:

Known only from Colombia and Peru.

Types:

Holotype female: PERU, Madre de Dios: Avispas, 400 m, X-1/15-1962, L. Peña (MCZ).

Paratypes (1 male, 1 female): COLOMBIA, Putumayo: Puerto Asís, VII-4-74, M. Cooper, ♂ (BMNH). PERU, Cuzco: Quincemil, 750 m, X-16/31-62, ♀, L. Peña (USNM).

Etymology:

The name styphopteron is a combination of the Greek words stypho (= contract) and pteron (= wing), a reference to the reduction (or contraction) of the submarginal cells in the forewing of this species.

**Cressoni Group**  
(Figs. 3, 131–252)

The cressoni group, a neotropical endemic, is the largest and most difficult assemblage of New World Pison; its species are fairly monotonous morphologically, diagnostic characters are few, and some are variable. Adding to this malaise is the fact that the male is unknown in four species (erebus, martini, pentafasciatum, phthinylla), and not positively associated in a fifth (maculipenne). Finally, I have studied twelve specimens, mostly females, that undoubtedly represent a number of undescribed species. I am reluctant to attempt description of them because each is represented by one sex and only one to three specimens. In the cressoni group, a single female is usually not sufficient to determine if it represents a distinct taxon, or is simply a variant of a known species. Several species recognized here, maculipenne, chrysops, and arachniraptor, may contain hidden species. Obviously my treatment of this section of the genus has to be considered a beginning framework.

Species characters are confined mainly to features of the head (shape of clypeal margin, ocellocular distance, details of male flagellum, etc.), occasional wing venational differences, and male genitalia. The descriptions that follow will, therefore, be rather brief. The following description outlines the morphology common to nearly all species in the cressoni group.

Description:

Body black but terga I–III often rimmed with creamy yellow bands, legs and/or body sometimes extensively yellow brown; forewing usually infumate along leading edge (medial through marginal cells), rest of wing clear to yellowish. Vestiture pale except sometimes brownish on gaster, mostly appressed, erect setae short and confined to propodeum and mesopleural venter when present.

Frons, most of thorax, and gaster densely, finely punctate, punctures no more than diameter apart on thorax, and often nearly contiguous.

Female mandible with inner subapical tooth (fig. 133), male mandible simple apically. Labrum quadrangular or transverse, free margin straight or arcuate, usually with median notch. Clypeal free margin with liplike rim that is impunctate, asetose, and usually shiny; this rim broadest at middle and often projecting as median lobe that may bear three or four toothlike lobes in female, one or three in male; clypeal margin thickened or double-edged especially laterally. Antenna not elongate, distal flagellomeres about as long as broad. Male antenna sometimes with tyli, flagel-



lomeres sometimes asymmetrically swollen. Frons moderately swollen, dull, punctures often shallow. Occipital carina ending just short of hypostomal carina, or narrowly interrupted at midventral line where it is narrowly separated from hypostomal carina. Pronotum without anterodorsal lamelliform flange, but usually with oval to broadly transverse anterodorsal pit that is obscured by decumbent setae, pit rarely absent (abothrum, aranevorax); collar noncarinate, as thick as metanotum or slightly thinner. Scutal flange nearly as broad as hindocellus, not strongly upturned; scutum dull or weakly shiny. Scutellar punctation usually of one size, uniform, punctures mostly diameter apart or less. Tegula entirely punctate or impunctate on outer half. Propodeum smooth, shiny, finely punctate, without dorsolateral crenulate ridge between spiracle and petiole socket, sometimes with weak median longitudinal ridge on dorsum, often with weak cross-ridges on hindface just above petiole socket. Disk of propleuron impunctate, usually polished. Episternal sulcus incomplete ventrad, disappearing as it turns toward anteroventral margin of pleuron. Metapleural flange not lamellate. Forewing media usually diverging from M+Cu after crossvein cu-a (before cu-a in abothrum, brasilium); forewing usually with three submarginal cells, the second usually receiving both recurrent veins (fig. 131); only two submarginal cells in three species (aranevorax, erebus, phthinylla) due to loss of distal veinlet of the true second submarginal cell (fig. 132); submarginal cell III often very long, its length often approximately half that of I and its anterior veinlet often as long as or longer than posterior veinlet of submarginal cell II (fig. 131). Hamuli of hindwing divided into two groups. Hindcoxa only with apical remnant of outer dorsal carina, inner carina usually complete; tarsomeres weakly spinose apicoventrally, plantula present on IV or apparently absent (abothrum, aranevorax, dementia, phthinylla), claws normal. Gaster dull or shiny, tergal margins single-edged; male tergum VII blunt apically or conical, male sternum VIII semicircularly notched apically; genitalia slender, volsellar lobes usually elongate and fringed apically with setae, inner margin of gonostyle with midventral lobe that varies from foliaceous to digitiform, apical half of gonostyle usually densely clothed with long setae ventrally, and with short setae on inner surface, aedeagus usually slender, without defined head or ventral spine.

#### Included species:

Pison abothrum, arachniraptor, aranevorax, brasilium, cameronii, chrysops, cressoni, dementia, erebus, maculipenne, martini, pentafasciatum, phthinylla.

#### Discussion:

The most distinctive features of the cressoni group are: the subapically dentate female mandible, the polished impunctate propleuron, the incomplete episternal sulcus, the elongate third submarginal cell, the infumate anterior margin of the forewing, and the smooth propodeum (no crenulate ridge at top of side). In the New World fauna the tendency for the terga to be margined by yellow is unique to the cressoni group. Another attribute of the group is the tendency for the legs and body to be partially yellowish or reddish brown. Some species appear to lack tarsal plantulae: abothrum, aranevorax, dementia and phthinylla. Subapically dentate mandibles also occur in the krombeini and stangei groups.

Apomorphies of the group include the subapically dentate female mandible, the incomplete episternal sulcus, the polished impunctate propleuron, the elongate third submarginal cell, the notched male sternum VIII, and the ventral lobe of the gonostyle. The yellow tergal bands found in many species, and the loss of the second submarginal cell in three species (aranevorax, erebus, phthinylla) are apomorphic trends of the cressoni group, the last character state found elsewhere in Pison.

The male genitalia offer reliable species differences. Those of cressoni and chrysops are unusual in that the gonostyle is comparatively stouter than in other species, is sparsely setose ventrally and lacks setae on the inner surface. The volsellar lobes are unusually stout and sparsely setose in these two species, and they are probably closely related. The aedeagus most often is acuminate apically in the cressoni group, but in aranevorax and abothrum it ends in an expanded "head".



The midventral lobe of the gonostyle is least developed in these two species also, but it is a long, narrow blade-like or finger-like structure in maculipenne, brasilium, arachniraptor, cressoni and chrysops. Pison maculipenne, brasilium and arachniraptor seem closely related based on their genitalic structure.

Pison cressoni Rohwer  
(Figs. 131, 133-148)

Pison cressoni Rohwer, 1911:570. Holotype female: Nicaragua, San Antonio USNM).

Pison flavolimbatum Turner, 1917:112. Lectotype female: Guyana, Issororo (BMNH), present designation. NEW SYNONYMY.

Pison sp., Oniki, 1970a:726. Nest.

Pison sp., Oniki, 1970b:354. Nest, parasite.

Description:

Infumation of forewing brown, uniform through medial, submarginal I and marginal cells. Head black, except scape usually yellowish brown at least on lower surface, and frequently scape, pedicel, and flagellomere I (or II in some males) entirely yellowish brown. Thorax black except foretibia rarely brownish in male. Gaster entirely black but usually terga I-II or III with apical creamy yellow bands of variable width. Metallic setae of face, gena, pronotal collar, and propodeal dorsum usually golden (lower facial setae sometimes silver, propodeal setae rarely brownish).

Female clypeal margin with short median lobe whose free edge is sinuate and reflexed upward (surface of median lobe with transverse crease, fig. 136), sinuation delimiting three or four weak angles or more protuberant teeth (depending on whether or not middle angle or tooth is emarginate resulting in two points)(figs. 137-138), lower margin of lateral tooth continued laterad as carina delimiting broadly thickened lateral part of clypeus (ventral view, fig. 135); male clypeus with three prominent teeth at middle that are not reflexed, middle tooth slender (Central America and Santa Catarina, Brasil, fig. 139) or broad basally and blunt apically (Colombia, Trinidad to Peru and Sao Paulo, Brasil, fig. 140), margin of outer tooth extended laterad as carina just as in female but delimiting broader area (fig. 141). Male flagellomeres without tyli, not asymmetrically swollen. UID in female 0.67-0.75X LID; UID in male 0.77-0.84X LID. OOD in female usually 0.72-0.92X HOD, but 1.0-1.15X HOD in largest specimens; OOD in male 1.0-1.12X HOD. Occipital carina ending just as it reaches apex of hypostomal carina. Anterodorsal pit of pronotum deep, usually smaller than hindocellus but sometimes transversely elongate. Tegula punctate only on inner half. Punctuation of scutellum usually conspicuously sparser on posterior one-half to one-third, interspaces shiny, some micropunctures irregularly mixed with macropunctures in this area (fig. 142), these micropunctures (actually pores - see fig. 143) present even when macropunctuation is fairly uniform over entire scutellum (in some males from Central America punctuation is fairly uniform and micropunctures very scarce). Male sternum VIII constricted before apex, apex rounded lateral to emargination (fig. 148). Genitalia as in figs. 144-147, midventral lobe of gonostyle long, slender, curving inward in ventral view (fig. 146).

Length 8-12.5 mm (female), 8-10 mm (male).

Discussion:

Pison cressoni, a commonly collected species, is recognized by the reflexed lobe of the female clypeus (fig. 136), the broad ocellocular distance (0.72-1.15X HOD), the sparsely bipunctate posterior part of the scutellum (fig. 142), the shape of male sternum VIII (fig. 148) and the genitalia (figs. 144-147). Within the cressoni group, the bipunctate scutellum is unique to this species. The "micropunctures" are actually pores (fig. 143) but at 50X magnification they look like punctures. These pores are often clustered in groups of 2 to 6. The genitalia of cressoni only resemble those of chrysops, and the two species are probably more closely related to each other than to



others in the group. Male sternum VIII is constricted before the apex in both species, unlike others in the cressoni group. The midventral lobe of the gonostyle is elongate in both species, but the shape of sternum VIII and the volsellar lobes differ between them (compare figs. 144-148 & 155-159).

The variation in cressoni is vexing. Males from Central America and also the southernmost part of the species' range (Santa Catarina, Brasil) have narrow, fingerlike clypeal "teeth", while elsewhere the teeth are shorter, and the middle one is broad at the base (compare figs. 139-140). The male genitalia are uniform over the range of the species however. Some variation in the outline of the female clypeal lobe is also evident (figs. 133-134), but the reflexed lip is a fairly constant feature. In specimens with a weakly reflexed lip, the OOD:HOD and/or scutellar punctation generally provide positive identification. The punctation of the scutellum varies from sparse on the posterior half to nearly uniform over the entire surface. But in every case a few micropunctures are visible (50X magnification) on the posterior half.

Pison cressoni resembles maculipenne, another commonly collected species, and the two are largely sympatric. Pison maculipenne differs in having a non-reflexed (flat) clypeal lobe surface in the female, a narrower ocellocular distance (OOD in female 0.43-0.65X hindocellus diameter except up to 0.75X HOD in largest specimens), a narrower UID (UID in female 0.57-0.66X LID), a uniformly monopunctate scutellum, a differently shaped male sternum VIII, and the genitalia. Furthermore, the wings of maculipenne are often amber colored, and the body sometimes has yellowish brown areas that are often extensive. In particular, laterotergite I of maculipenne is usually yellowish brown, while in cressoni it is black. The occipital carina of maculipenne is a complete circle that is tangential with the hypostomal carina or narrowly separated from it. In cressoni the occipital carina ends just before reaching the hypostomal carina.

I have examined the type of cressoni. Rohwer indicated that his specimens were males but in fact the holotype and paratype are females. I have seen two of Turner's three syntypes of flavolimbatus, and selected one as lectotype.

#### Range:

Southern Mexico to Trinidad, Peru and Santa Catarina, Brasil. Apparently widespread in South America.

#### Material examined (96 females, 35 males):

MEXICO, Veracruz: UNAM reserve, 32 km n Catemaco, I-10-82, J. W. Wenzel (USNM). BELIZE: Toledo, Punto Gorda (BMNH). GUATEMALA: El Salto, Escuintla (BPBM); Sa. Emilia, Pochuta (MCZ). HONDURAS: nr. Tegucigalpa, emerged from nest of Eutachyptera psidii (Lasiocampidae)(USNM). NICARAGUA: San Antonio (USNM). COSTA RICA: Golfito (MCZ). PANAMA: Barro Colorado I., Phil Rau note #7812 (USNM, AMNH). COLOMBIA, Arauca: Tame (BMNH); Valle: Cali (MCZ); Vaupés: Mitu, M. Cooper note 85 (BMNH); Magdalena: N. Sierra Nevada de S. Marta, Río Buritaca (BMNH); Becerril, Quebrada Socorpas (USNM); Caqueta: Yuruyaco, 73 km sw Florencia (BMNH); Putumayo: Mocoa (BMNH). ECUADOR, Napo: Limoncocha (USNM); Pichincha: Nanegal (COOPER); Morona-Santiago: Cord. de Cutucu, 6 km e Macas (COOPER). PERU, Junín: Valle Chanchamayo (LILLO); Huanuco: Cueva de Las Pavas, nr. Tingo Maria (LILLO); Monson Valley, Tingo Maria (CAS); 67 km e Tingo Maria (CAS); Tingo Maria (CSDA, MCZ, USNM, AMNH); Loreto: Pucallpa (USNM). TRINIDAD: Maracas Valley, from mud cells (USNM, BMNH). GUYANA: Bartica (CU); Waratuk (AMNH); Demerara River (CU); Issororo (BMNH); North West District (BMNH). SURINAME: Raleigh-Vallen (USNM); Paramaribo (LEIDEN); Brownsberg (PMA). BRASIL, Pará: Belém (UCD, VIENNA); nr. Belém, ex cells in bird nests (Phaethornis ruber and Tolmomyias flaviventris) (USNM); Federal District: Brasília (RAW, BMNH, DIAS; Minas Gerais: Juiz de Fora (RAW); Lassance (CU); env. Passa-Quatro (PARIS); Lagoa Santa (HALLE). Sao Paulo: no location (USNM); no location, ex nest of Phaethornis squalidus (USNM); Santa Catarina: Blumenau (VIENNA).



Biology:

Oniki (1970a, b) discovered the cells of a Pison sp. inside the lower part of nests of the hummingbird, Phaethornis ruber. Voucher material in the USNM has enabled me to identify the wasp as cressoni. Oniki examined the nests of three other hummingbird species in her Belém study area, but none contained cells of Pison, suggesting that cressoni prefers P. ruber nests, at least at that location. Eight out of 13 bird nests examined by Oniki contained cressoni cells. Such nests had a small entrance near the bottom and contained up to 13 mud cells of the wasp. The opening of a cell faced downward and three to five spiders were provisioned. Besides rearing examples of cressoni from one such nest, Oniki obtained a female of the genus Brachymeria, possibly a parasitoid of the wasp although this chalcidid genus does not commonly attack sphecids. She suggested that possibly more than one Pison nest occurred in some of the bird nests.

Oniki subsequently obtained specimens of Pison cressoni from mud cells in the nest of the flycatcher Tolmomyias flaviventris (Tyrannidae) near Belém (voucher material in USNM), but she has not published details as yet. A chrysidid of the genus Trichrysis determined as "species 6" (USNM) by R. M. Bohart emerged from some of the cells. The USNM collection also has an old Brazilian specimen of cressoni with the notation "Nester im Neste von Phaethornis squalidus".

Pison cressoni makes nests in other sheltered situations. The material from Veracruz, Mexico, was reared from mud cells that were built inside an abandoned nest of the vespid genus Polybia (Wenzel, in litt.). The single specimen listed above from Honduras emerged from the larval tent of the lasiocampid moth Eutachyptera psidii. Notes by Martin Cooper on a specimen of cressoni from Mitu, Colombia (85) say "seen entering a rolled-up mosquito net suspended from ceiling of a room. When net opened remains of very thin and cylindrical mud cell found attached to netting." Mud cells of cressoni from Barro Colorado I., Panama, collected by Zetek (AMNH) have small, wool-like fibers imbedded in them suggesting that they were in some kind of nest. I have also studied material of cressoni from Trinidad that Callan reared from mud cells without annotation as to substrate.

Pison chrysops Menke, n. sp.  
(Figs. 149–159)

Description, holotype female:

Infumation of forewing leading edge uniformly brown from apical half of medial cell through apex of marginal cell, wing membrane practically clear. Body black except as follows: scape obscurely brownish; palpi yellowish brown; apical half of mandible reddish brown except apex dark; pronotal lobe, tegula, scutal flange, femora beneath, and laterotergites I–II reddish brown. Clypeus, lower frons and gena with dense appressed silver setae; frontal setae changing to gold at level of eye notch and continuing narrowly dorsad along orbit to level of ocelli; pronotal collar, hind margin of scutum, metanotum, and propodeum (except middle of hindface and side adjacent to metapleuron) densely covered with appressed gold setae; meso- and metapleuron sparsely covered with appressed silver setae. Terga I–III with broad, creamy yellow bands apically, sternum II with narrow apical creamy yellow band.

Clypeal margin without median lobe but smooth polished rim broadened at middle, upper edge of rim not elevated above adjacent clypeal punctation; clypeal edge with four weak angles, the middle pair of which surround cuplike pit in ventral view (similar to figs. 151–152), the margin between these two middle angles slightly reflexed upward; in ventral view margin thin at middle (except for pit between middle angles), but moderately thickened laterad of angles (similar to fig. 152). UID 0.72X LID. OOD 0.96X HOD. Occipital carina incomplete ventrally, ending near apex of hypostomal carina. Pronotum with transversely elongate anterodorsal pit. Tegula impunctate on outer half. Scutellar punctures separated by less than diameter to two diameters. Media of forewing diverging from M+Cu just after crossvein cu-a. Hindtarsomere IV with plantula.

Length 7.5 mm.



Variation in female (32 specimens):

Scape occasionally all black; legs rarely all black (Guyana); scape, pedicel, and flagellomere I yellow brown (Peru; Salta, Argentina); clypeal margin reddish brown (Colombia; Salta, Argentina). Anterior half of propodeal side or even entire side sometimes without dense, appressed gold setae, and such setae rarely restricted to disk of dorsum and interface between hindface and side (Tena, Ecuador; Guyana; Belém, Brasil). Tergum III sometimes without yellow band (Santa Catarina, Brasil), or band very thin (Santa Catarina, Brasil; n Argentina); sternum II usually without yellow band. Clypeal margin variable (figs. 149-151), lateral angles sometimes weak or absent, middle pair sometimes strongly reflexed. UID 0.65-0.79X LID. OOD 0.82-1.16X HOD, except in two extreme specimens: 0.55X (Ecuador, 60 km s Guayaquil) and 0.60X (Colombia, Barbacoas). There is a strong tendency for the UID and OOD to become proportionally greater toward the southern part of the range (s Brasil, n Argentina). Media of forewing usually diverging well beyond crossvein cu-a, the distance equal to about one-third of cu-a length. Length 7-8 mm.

Male (7 specimens):

Differs from female as follows: scape pedicel, flagellomeres I-IV, labrum, and mouthparts sometimes yellow brown (Bolivia); foreleg reddish brown (Bolivia). Appressed setae on gena gold and on propodeal side silver (Bolivia), appressed mesopleural setae silver (El Limon, Venezuela). Sternum II without yellow band. Clypeal margin with three teeth, edge thickened in ventral view (figs. 153-154). Flagellum simple. UID 0.78-0.84X LID. OOD 0.93-1.18X HOD. Media of forewing sometimes interstitial with crossvein cu-a (Palmar, Costa Rica). Sternum VIII constricted before apex (fig. 159). Genitalia as in figs. 155-158; midventral lobe of gonostyle long, slender, the tip usually incurved in ventral view (fig. 157). Length 7-8 mm.

Discussion:

Pison chrysops is one of the more commonly collected and wide ranging neotropical species. The dense covering of gold setae on the propodeum is the most conspicuous recognition feature, although the propodeum of some cameronii and arachniraptor is partially covered by gold setae. The broader ocellocular distance of chrysops usually separates it from these two species however, and the female clypei differ (compare figs. 149-151, 186-188, & 204-210). The female clypeus is variable but its thin margin and lack of a median lobe are fairly diagnostic for separation from some of the other black-legged species in the cressoni group. In the male, the simple flagellum, clypeal teeth, sternum VIII, and genitalia are diagnostic in combination. The genitalia and sternum VIII are most similar to cressoni. The uniformly punctate scutellum of chrysops distinguishes it from cressoni.

Two female specimens are rather disconcerting. Both have an unusually narrow ocellocular distance: OOD is 0.60X HOD in a specimen from Barbacoas, Colombia (COOPER) and 0.55X HOD in a specimen from 60 km s Guayaquil, Ecuador (MCZ). I have not included these in the paratype series although I am fairly certain that they are conspecific with chrysops.

Range:

Pison chrysops is known from Costa Rica to northern Argentina and southern Brasil.

Types:

Holotype female: COSTA RICA, Punta Arenas: Palmar, III-1950, D.O. Allen (USNM).

Paratypes (30 females, 7 males): COSTA RICA, Guanacaste: I-22/23-77, D. H. Janzen (AEI); Punta Arenas: Golfito, XII-1948, P. & D. Allen (MCZ), Esquinas nr. Golfito, 1948, P. & D. Allen (MCZ), Palmar, V/VI-1950, D. O. Allen (USNM). PANAMA, Canal Zone: Barro Colorado I., VI-14-39, Zetek (USNM). VENEZUELA, Aragua: Rancho Grande, V-12-46, W. Beebe (AMNH), El Limon, 480 m, V-21/22-73, C. J. Rosales (UCM); Distrito Federal: La Guaira, VII-4-1900, Lyon and Robinson



(USNM). COLOMBIA, Magdalena: Río Frio, X-15-27, G. Salt (BMNH); Meta: Restrepo, 500 m, VIII-1936, J. Bequaert (MCZ). PERU: Diversos, P. Weiss (USNM). ECUADOR, Napo: Tena, 500 m, IV-11/28-76, M. Cooper (BMNH). BOLIVIA, Beni: Río Itenez at mouth of Río Baures, IX-30-64, J. Bouseman (AMNH). GUYANA: Rupununi Savannah, II-7-34, J. Meyers (USNM). SURINAME: Paramaribo, I-7-58, P. van Doesburg (LEIDEN). BRASIL, Pará: Belém, VI-1903, A. Ducke (VIENNA); Sao Paulo: Campinas, II-1924, F. X. Williams (BPBM); Santa Catarina: Nova Teutonia, various dates, Fritz Plaumann (UCD, MCZ, OSU, BMNH). ARGENTINA, Salta: Río Pescado nr. Orán, IX-24-71, C. Porter (LILLO), Pocitos, I-1971, M. Fritz (FRITZ); Entre Rios: Pronunciamiento, I-1/5-65 (LECLERCQ).

Metatypes (2 females): COLOMBIA, Nariño: Barbacoas, 50 m, VIII-16-84, M. Cooper (COOPER). ECUADOR: Balao Chico, 60 km s Guayaquil, IV-23/29-63, L. Peña (MCZ).

#### Etymology:

The name chrysops is a Greek word meaning gold-colored, in this case a reference to the dense covering of gold setae on the propodeum.

#### Pison erebus Menke, n. sp. (Fig. 160)

#### Description, holotype female:

Infumation of forewing brown and uniform through medial, submarginal I and marginal cells. Body black except scape, pedicel and flagellomere I reddish brown. Clypeus, lower frons, gena, and dorsum of collar with dense appressed gold setae.

Clypeal margin with short median lobe whose free edge is broadly concave, surface of lobe with semicircular impression (fig. 160), edge thickened laterally as in cressoni (ventral view) and with median dimple. UID 0.72X LID. OOD 0.71X HOD. Occipital carina narrowly interrupted ventrad, its ends tangential with hypostomal carina apex. Anterodorsal pit of pronotum transversely oval, length equal to hindocellus diameter. Tegula uniformly punctate. Scutellum uniformly punctate, punctures of one size. Forewing with two submarginal cells through loss of outer veinlet of true second submarginal cell.

Length 8 mm.

#### Male:

Unknown.

#### Discussion:

Pison erebus is one of three species in the cressoni group that have only two submarginal cells. It differs from phthinylla and aranevorax in having a broader OOD, and a distinctive clypeus (fig. 160). The reddish brown antennal base and golden haired clypeus and lower frons contrast distinctively with the black body, but they may prove to be an unreliable features when more material is available. Pison erebus resembles cressoni but the uniform scutellar punctation, wing venation and absence of yellow tergal bands separate it from the latter species.

#### Range:

Known only from the holotype collected in Colombia.

#### Type:

Holotype female: COLOMBIA, Caqueta: Yuruyaco, 73 km sw Florencia, II-8-1979, M. Cooper (BMNH).

#### Etymology:

Erebus, a noun in apposition, is the name of the Roman god of darkness, a reference to the predominant black color of the species.



Pison pentafasciatum Menke, n. sp.  
(Fig. 161)

Description, holotype female:

Infumation of forewing yellowish brown, darkest on submarginal cell I and marginal cell, rest of wing clear with yellowish brown veins. Body black except for broad yellow apical bands on terga I-V (as wide as metanotum), those on III-IV bisinuate on basal side; sterna II-IV with narrower apical yellow bands; laterotergites I-II brownish translucent. Head without obvious metallic setae, surface sculpture of face not obscured.

Clypeal margin with short median lobe (fig. 161), its free edge with blunt median tooth whose apex is dimple-like in ventral view, edge of lobe not thickened in ventral view, but clypeal margin lateral to it thickened. UID 0.77X LID. OOD 1.23X HOD. Occipital carina incomplete ventrally, ending well before midline of head. Anterodorsal pit of pronotum transversely elongate, length greater than hindocellus diameter. Tegula impunctate on outer half. Scutellum broadly convex.

Length 9 mm.

Male:

Unknown.

Discussion:

Pison pentafasciatum is easily recognized by the broad yellow bands on the first five terga, the very broad ocellocular distance, and the absence of appressed metallic facial setae. The clypeus is also fairly distinctive (fig. 161).

Range:

Known only by the holotype from southeastern Brasil.

Type:

Holotype female: BRASIL, Santa Catarina: Cauna, XII-1945, A. Maller (UCD).

Etymology:

The name pentafasciatum is a combination of the Greek word penta (= five) and the Latin fascia (= band) and refers to the yellow abdominal bands.

Pison martini Menke, n. sp.  
(Figs. 162-165)

Description, holotype female:

Infumation of forewing leading edge brown, darkest on marginal cell, wing membrane pale brownish behind. Following body parts yellowish brown: scape, pedicel, flagellomere I, labrum, palpi, pronotal lobe, and legs except coxae and dorsum of hindfemur; following are reddish brown: clypeal lobe, mandible (dark at tip), rim of petiole socket, and laterotergite I; gaster without creamy yellow tergal bands. Following with dense, appressed gold setae: clypeus, lower frons and narrowly along inner orbit to level of ocelli, gena, and top of pronotal collar; setation of rest of thorax including legs paler, longest on propodeum; gaster with decumbent brownish setae.

Clypeal margin with short median lobe whose edge is slightly trisinate in frontal view, surface of lobe smooth, flat (similar to fig. 163); edge of clypeus slightly thickened as seen in ventral view, hind edge of lobe sinuate (similar to fig. 165). UID 0.60X LID. OOD 0.64X HOD. Occipital carina incomplete ventrad, ending near apex of hypostomal carina. Anterodorsal pit of pronotum deep, transversely elongate, slightly longer than hindocellus diameter. Tegula with punctures near outer edge as well as on inner half, small discal area impunctate. Propodeal dorsum with fine longitudinal carina at base. Hindtarsomere IV with tiny plantula. Thorax and gaster



elongate, tergum I length (measured in dorsal view) 1.22X apical width. Tergum II swollen in lateral profile in contrast to adjoining terga (fig. 162).

Length 11 mm.

Female variation (3 specimens):

Flagellomere I sometimes black; hindfemur sometimes entirely yellowish; UID 0.57–0.62X LID; OOD 0.60–0.64X HOD; clypeal lobe truncate in two specimens (fig. 164); fine carina of propodeal dorsum extends to the latter's apex in one specimen; length to 12 mm.

Male:

Unknown.

Discussion:

Pison martini, the largest species of the cressoni group, has a distinctive, essentially truncate, clypeal lobe (figs. 163–164) although it is similar to that of maculipenne. The body is noticeably elongate in comparison to stocky species such as cressoni and maculipenne, but this is rather difficult to quantify. I have measured the length of tergum I as seen in dorsal view and contrasted that with its dorsal width. The tergum of martini is clearly longer than wide, while in cressoni and maculipenne tergum I is about as long as wide or slightly shorter than wide. The humped tergum II of martini is distinctive (fig. 162) but may prove to be variable when more material is available. Pison phthinylla, a species with only two submarginal cells (martini has 3), has a similarly humped tergum II. The color pattern of martini (yellowish legs, essentially all black gaster, golden appressed setae on head, and somewhat paler setae on rest of body) is distinctive too, but that may also prove to vary.

Range:

Known only from one locality on the amazonian side of Ecuador.

Types:

Holotype female: ECUADOR, Morona-Santiago: Macas, 1,100 m, II-1-1982, M. Cooper (BMNH).

Paratypes (3 females): two with same data as type except II-2-82 and II-9-84 (COOPER, USNM); one from Cord. Cutucu, about 6 km e Macas, about 1000 m, X-25-78 (BMNH).

Etymology:

The name martini is a dedication to Martin Cooper who has probably collected more neotropical material and species of Pison than any other person. Without his material this revision would have been far less complete.

Pison maculipenne Smith  
(Figs. 166–176)

Pison maculipenne Smith, 1860:80. Holotype female: Brasil, "Ega" (= Tefé) (BMNH).

Description:

Infumation of forewing variable: dark or light brown and uniform through medial, submarginal and marginal cells, or absent from submarginal cell or restricted to marginal cell; wing membrane often yellowish. Head usually entirely black except scape often brownish beneath; clypeus, mandible and mouthparts largely yellowish brown in occasional specimens (Ecuador and along Amazon River); scape, pedicel and flagellomere I, or I–II or III yellowish in same material. Thorax usually black except pronotal lobe, tegula, dorsum of petiole socket and closing face of femora sometimes paler; upper surface of tibiae occasionally also pale; tarsomeres I in some specimens (including both males) largely white or yellowish; thorax, including legs, extensively



yellowish brown in some Ecuadorian material (Tena) with black restricted to scutum (sometimes partly pale), scutellum, metanotum, propodeal dorsum and side, mesopleural venter (sometimes partly pale), and base of mid and hindcoxae; thorax even more yellowish brown in some Brazilian specimens (holotype, Tefé) and (Pará): black restricted to metanotum and propodeal side. Gaster usually black except laterotergite of tergum I yellowish or reddish, apex of tergum I and sometimes II translucent or with creamy yellow band; reddish tint of gaster sometimes more extensive: segment I largely pale (some Colombian and Ecuadorian material), segment I and tergum II occasionally extensively or completely pale (Trinidad, some Colombian and Ecuadorian material, holotype from Tefé), abdomen extensively pale in one specimen from Tena (terga II-VI and sterna II-V black only basally) and one from Pará (only small dark area on tergum III). Metallic setae of clypeus, gena (typically sparse) and elsewhere usually silver, golden only on specimens that have extensively yellowish bodies, and then entire head often densely gilded.

Female clypeal margin with short median lobe whose free edge is typically weakly sinuate (fig. 166) or even just straight, sinuations sometimes forming three or four "teeth" (especially strong in s Brasil, figs. 168-169), lobe not reflexed (polished surface flat and usually raised above adjacent punctation), free margin of clypeus lateral to lobe narrowly thickened (ventral view, fig. 167); male clypeus with three prominent teeth (fig. 170), margin of outer tooth sloping laterad beneath and behind clypeal margin forming broad, thick edge in ventral view (fig. 171). Male flagellum simple. UID 0.57-0.66X LID in female; 0.69-0.71X LID in male. OOD in female usually 0.43-0.65X HOD, but up to 0.75X HOD in largest specimens; OOD 0.72X HOD in male. Occipital carina complete, tangential with or slightly separated from apex of hypostomal carina. Anterodorsal pit of pronotum transversely elongate, as long or longer than hindocellus diameter. Tegula sometimes completely punctate although sparsely so on outer half. Propodeal dorsum sometimes with fine, longitudinal carina at base. Male sternum VIII as in fig. 176. Genitalia as in figs. 172-175, midventral lobe of gonostyle elongate, its apical half dorsoventrally compressed (fig. 172).

Length 8.5-11.5 mm in female, 8.5 mm in male.

#### Discussion:

Pison maculipenne, a commonly collected wasp, is a puzzling species for two reasons. Over its range it displays considerable color variation, some of which does not seem to follow any particular pattern. The other problem concerns the identification of the male; I have three possible candidates and I am not positive that I have selected the correct one.

The wing membrane color alone (whether it is clear or yellowish) suggests at first that two species are involved. For example, both types occur on Barro Colorado I. in Panama. However, I have been unable to find any other basis for separating the two color forms as separate species. Perhaps this wing color variation is microenvironmentally induced. MacLean, Chandler and MacLean (1978) demonstrated that color variation in Polistes was highly correlated with nest microclimate (relative humidity-temperature). Another color variable is the striking xanthochroism of a few specimens in Ecuador and Brasil, including the holotype. Intermediate stages between the common, essentially black type to the extreme yellowish forms, suggests that a broad spectrum of color morphs probably exist. Much more collecting will be needed before the extent and significance of this xanthochroism can be analyzed.

Selecting the male of maculipenne from three possible candidates has been frustrating. Head measurements, configuration of the occipital carina, and clypeal details do not offer a means of correlating one of the three with the female, and I have resorted to wing membrane color alone. Collecting locality information is of no use since the three male species are sympatric with the female distribution, some having been taken at the same locales as some of the females. The males differ in antennal structure. The flagellum is simple in one male species (Canal Zone, Panama - PMA, Venezuela - USNM); flagellomeres II-VI have raised linear tyli in another (Colombia - BMNH); and in the third flagellomeres III-VII are asymmetrically swollen and associated with them are narrow to welt-like tyli (Peru - MCZ; Colombia -



Cooper; Brasil – AMNH). The genitalia of the three male species are fairly similar. In each the tip of the midventral lobe of the gonostyle is paper-thin in side view. In ventral view these paired appendages diverge in two of the male species, in the third (the male with antennal tyli) they curve outward resembling the horns of a cow. Minor differences in the volsellar lobes have been noted. There are slight differences in the clypeus among the three male species. The two males from Panama and Venezuela have a yellowish wing membrane, a characteristic of many females of maculipenne, and a feature unknown in other species of the cressoni group. On that basis I have treated these two specimens as the male of the species.

The male enigma poses one obvious question: does my treatment of maculipenne possibly represent a complex of two or three extremely similar species, the males of which are represented by the three types discussed above? Only rearing of nestmates can resolve this conundrum.

I have examined two possible "types" of maculipenne from the BMNH, one from "Ega" and one from "Para", but only the former agrees perfectly with Smith's description. The color pattern of the Pará specimen does not agree with the original description, and this locality was not listed by him. Smith does not suggest that he had more than one specimen, and I consider the wasp from Ega as the holotype.

Pison maculipenne is similar to cressoni and differences are discussed under that species. Pison martini is perhaps the closest relative of maculipenne. The female clypeus is similar in both (compare figs. 166–169 & 163–165). Pison maculipenne has a normal tergum II, while in martini it is humped (fig. 162). Tergum I is about as long as wide in maculipenne, but longer than wide in martini. Unfortunately the male of martini is unknown. On the basis of the form of the midventral lobe of the gonostyle, and other aspects of the male genitalia, maculipenne, brasilium, arachniraptor, and possibly cameronii, are closely related.

#### Range:

Costa Rica to Bolivia, eastward to Trinidad and southward to southern Brasil.

#### Material examined (60 females, 2 males):

COSTA RICA: Golfito (UCD). PANAMA, Canal Zone: Barro Colorado I. (AMNH, USNM, PMA). COLOMBIA, Narino: Barbacoas (BMNH, COOPER); Caqueta: Yuruyaco, 73 km sw Florencia (BMNH); Meta: La Macarena (BMNH), Cordillera Macarena (BMNH); Putumayo: Mocoa, 550 m (BMNH, COOPER), Villa Garzon, 400 m (BMNH, COOPER), Puerto Leguizamo, 180 m (BMNH); Cauca: Napoles, 350 m, 5 km e Puerto Limon (COOPER). ECUADOR, Napo: Muyuna, 500 m, 5 km w Tena, (biol. note 33, "on leaf with prey, a spider, in primary forest") (BMNH, COOPER), Tena (BPBM). PERU, Loreto: Pucallpa (BMNH); province?: El Campamiento, Col. Perone (CU). BOLIVIA, Beni: Rio Mamore, 10 km e San Antonio (AMNH). VENEZUELA, Bolivar: El Bochinche Res. Forestal Imataca, 200m (UCM); Zulia: Los Angeles del Tucucu (USNM). TRINIDAD: Arima Valley, 800–1200 feet (AMNH). GUYANA: Rupununi Savannah (BMNH). SURINAME: (VIENNA). BRASIL, Pará: no locality (VIENNA, BMNH); Amazonas: Tefé (BMNH); Minas Gerais: Pedra Azul (AEI); Guanabara: Rio de Janeiro (USNM).

#### Pison brasilium Menke, n. sp. (Figs. 177–185)

#### Description, holotype male:

Forewing without discrete dark infumation along leading edge, membrane weakly brownish. Body black except as follows: mandible center, tegula and laterotergite I reddish brown. Lower frons, clypeus, gena, top of pronotal collar, and metanotum laterally with dense, appressed silver setae; propodeal dorsum and interface between side and hindface with dense silver setae that do not obscure sculpture. Terga I–III with broad creamy yellow apical bands.

Clypeal margin with three similar teeth, margin sinuate laterad (similar to fig. 179), edge thickened in ventral view (similar to fig. 180); polished rim not elevated



above clypeal punctation. Flagellomeres III-VII with polished, linear tyli beneath, those on III and VII short. UID 0.98X LID. OOD 1.71X HOD. Occipital carina incomplete ventrally, ending short of hypostomal carina apex. Pronotum with transversely elongate anterodorsal pit. Tegula impunctate on outer half. Propodeal hindface transversely rugosopunctate just above socket, changing to coarse, dense transverse striatopunctation toward dorsum, punctures coarse, essentially contiguous; punctation of propodeal side dense, punctures less than a diameter apart. Media of forewing diverging from M+Cu before crossvein cu-a. Hindtarsomere IV with tiny plantula. Sternum VIII similar to maculipenne. Genitalia as in figs. 181-185; midventral lobe of gonostyle long, narrow, laterally compressed (fig. 184), attenuate apically.

Length 6.25 mm.

Variation in males (3 specimens):

Forewing sometimes strongly infumate along leading edge; laterotergite I black; tyli present on flagellomeres III-VIII (short, weak on III and VIII), or IV-VI, or IV-VII; UID 0.92-0.94X LID; OOD 1.60-1.65X HOD; forewing media interstitial with crossvein cu-a in one specimen; length to 7 mm.

Female (3 specimens):

Body black except mandible and tegula obscurely reddish brown; clypeal margin without median lobe but with bidentate, slightly reflexed snout (fig. 177), sometimes small angulation present laterad, polished rim arcuately broadened above, clypeal edge thin in ventral view (fig. 178); UID 0.87-0.90X LID; OOD 1.35-1.57X HOD; forewing media occasionally interstitial with crossvein cu-a; length 7-8 mm.

Discussion:

The very broad upper interocular distance (UID nearly as broad as LID) and ocellocular distance (OOD more than 1.33X HOD) are distinctive features of brasilium, although dementia and pentafasciatum have similar proportions. The divergence of the forewing media before crossvein cu-a in most specimens of brasilium is also unusual in the cressoni group (abothrum is the only other species with this feature). The presence of linear tyli on the male flagellum, and the dense, coarse punctation of the propodeal side and hindface, with cross-ridging on the last, are also distinctive. The genitalia are similar to maculipenne but the midventral lobe of the gonostyle is laterally compressed (dorsoventrally compressed in maculipenne).

Range:

Known only from the Federal District of Brasil.

Types:

Holotype male: BRASIL, Federal District: Brasília, Lago Sul, IV-7-1977, A. Raw (BMNH).

Paratypes (3 males, 3 females): Federal District: Reserva Ecologica do IBGE, 20 km s Brasília, various dates, malaise trap (IBGE).

Etymology:

The name brasilium is based on the type locality, Brasília.

Pison arachniraptor Menke, n. sp.  
(Figs. 3, 186-203)

Description, holotype female:

Infumation of forewing leading edge light brown, wing membrane clear. Body black except as follows: pronotal lobe, tegula, and laterotergite I-II reddish brown. Lower frons with dense, appressed silver setae that are continued dorsad along inner orbit to level of ocelli, setae with slight golden tinge dorsad; clypeus not densely



silvered except at extreme lateral corner; gena with dense, appressed slightly golden setae; dorsum of collar with appressed slightly golden setae, rest of thoracic setae similarly colored or paler, but not dense except at base of propodeal dorsum and above hindcoxa. Terga I-III with creamy yellow bands, that on III narrow.

Clypeal margin without median lobe, but with concavity as wide as labrum that bears four angles (similar to fig. 186); margin of concavity thickened in ventral view, middle pair of angles delimiting pit (similar to fig. 187); clypeal rim around concavity sharply elevated above adjacent clypeal punctation (similar to fig. 186). UID 0.63X LID. OOD 0.36-.38X HOD (right and left OOD different). Occipital carina narrowly incomplete ventrad, the gap not tangential with apex of hypostomal carina. Pronotum with transversely elongate anterodorsal pit. Tegula narrowly impunctate laterad. Media of forewing diverging from M+Cu just after crossvein cu-a. Hindtarsomere IV with plantula.

Length 6.5 mm.

#### Variation in female (29 specimens):

Infumation of forewing sometimes dark brown, and membrane sometimes lightly brownish; scape often yellowish brown, rarely scape, pedicel and flagellomere I (sometimes base of II) rarely yellowish or reddish brown (Ecuador; Mato Grosso, Brasil); legs except coxae, trochanters, sometimes partly brownish. Appressed facial setae sometimes entirely golden (Ecuador). Terga I-III sometimes translucent apically rather than yellow banded, yellow bands sometimes only on I-II. Shape of clypeal concavity variable (figs. 189, 191-194, 196), edge often thinner in larger specimens (figs. 190, 195). UID 0.62-0.78X LID (UID proportionally greater in larger specimens). OOD 0.38-0.66X HOD except 0.70-0.82X HOD in largest specimens. Ends of occipital carina sometimes tangential with apex of hypostomal carina. Tegula sometimes punctate along outer margin but with small impunctate discal zone. Second recurrent vein occasionally interstitial between submarginal cells II-III. Length 6.5-8 mm.

#### Male (2 specimens):

As in female except: appressed facial and thoracic setae silver in one specimen; hindtarsomere I whitish in one specimen; terga I-II with broad creamy yellow bands, III with weak band; clypeal margin with three blunt teeth, middle one broadest (fig. 197), edge thickened in ventral view (fig. 198), polished rim sharply elevated above clypeal punctation (does not show in SEM photo, fig. 197); flagellum simple; UID 0.78-0.79X LID; OOD 0.70-0.77X HOD; second recurrent vein interstitial between submarginal cells II-III in one specimen; sternum VIII similar to maculipenne; genitalia as in figs. 199-203, apex of midventral lobe of gonostyle spatulate, twisted (figs. 202-203); length 7 mm.

#### Discussion:

The polished clypeal rim is elevated above the punctate part of the clypeus (figs. 186, 188, 196) in both sexes, a unique attribute of arachniraptor. The female clypeus typically has a broad shallow concavity containing four "teeth" (fig. 188) that is distinctive, but some metatypes vary widely and may not be conspecific (figs. 191, 193, 196). Several metatypes (indicated with an asterisk) may prove to be chrysops, a similar species. Pison arachniraptor has gold setae on the propodeum and occasionally it is dense as in chrysops. The ocellocular distance is narrower in arachniraptor than in chrysops, and the female clypei differ (compare figs. 186, 192, 194 & 149-151). The twisted, spatulate midventral lobe of the gonostyle is distinctive in the male (fig. 202).

The clypeal margin is less thickened in some of the largest females (figs. 190, 195). These and a few other atypical females have not been included in the paratype series.

#### Range:

Panama to Bolivia and Goiás, Brasil.



Types:

Holotype female: ECUADOR, Zamora-Chinchipe: Zumbi, VI-10-1976, A. Langley (USNM).

Paratypes (20 females, 2 males): PANAMA, Canal Zone: Barro Colorado I. V-12, G. Fairchild (MCZ). COLOMBIA, Putumayo: Villa Garzon, 8 mi. s Mocoa, VII-24-78, M. Cooper (BMNH); Villa Garzon, 400 m, X-13-84, M. Cooper (COOPER); Mocoa, various dates, M. Cooper (BMNH, COOPER); Meta: La Macarena, XI-20/29-76, M. Cooper (BMNH); Amazonas: Leticia, VIII-2-76, M. Cooper (BMNH). ECUADOR, Napo: Muyuna, 500 m, 5 km w Tena, IV-22-81, M. Cooper (COOPER); Pichincha: Rio Palanque Res. Sta., V-5/VII-25-85, S. & J. Peck (PMA); Morona-Santiago: Cord. de Cutucu, 6 km e Macas, 1100 m, VII-3/10-81, M. Cooper (COOPER). PERU, Huanuco: Monson Valley, Tingo Maria, XI-2-54, Schlinger & Ross (CAS); Cuzco: Quincemil, 750 m, XI-16/31-62, L. Peña (MCZ). BOLIVIA, Santa Cruz: Puerto Grether, 230 m, IX-22-81, M. Cooper (COOPER). VENEZUELA, Bolivar: El Hormiguero Meseta de Nuria, XII-13/17-74 (UCM). GUYANA: Mazaruni, VIII-19-1937, Richards & Smart (BMNH). BRASIL, Pará: Belém, IX-10-01, A. Ducke (VIENNA); Tucuruí, I-1979, M. Alvarenga (AEI); Rondani: Vilhena, XI-73, M. Alvarenga (AEI); Mato Grosso: Sinop, X-75, M. Alvarenga (AEI).

Metatypes (9 females): COLOMBIA, Putumayo: Villa Garzon\*, 400 m, X-10-84, M. Cooper (COOPER), Puerto Leguizamo, 180 m, X-27/29-71, M. Cooper (BMNH), La Hormiga near Mocoa\*, IX-5-78, M. Cooper (BMNH); Cauca: Napoles\*, 350 m, 5 km e Puerto Limon, Rio Caqueta, IX-15-84, M. Cooper (COOPER). ECUADOR: Cumbaratza, III/IV-65, L. Peña (MCZ). PERU, Madre de Dios: Quincemil, on branch R. Manu, XI-5/16-62, L. Peña (AMNH). BRASIL, Bahia: Cepec Itabuna, III-4 & VII-3-83, F. Benton (BMNH); Goiás: Jatai, XI-1972, M. Alvarenga (FRITZ).

Etymology:

The name arachniraptor is a combination of the Greek word arachne (spider) and the Latin word raptor (robber), and is a reference to the exclusive use of spiders as a larval food source by these wasps.

Pison cameronii Kohl  
(Figs. 204-220)

Pison fasciatum Kohl, 1884:339. Holotype female: "Mexico oder Peru" (VIENNA).

Preoccupied by Pison fasciatum Radoszkowski, 1876.

Pison cameronii Kohl, 1893:546, footnote 1. New name for fasciatum Kohl, 1884.

Description:

Infumation of forewing light or dark brown, often darkest over marginal cell. Head black except scape often brownish beneath and palpi yellowish, scape, pedicel and flagellomeres I-V yellowish in one male (Bahia, Brasil). Thorax black except: edge of pronotal lobe usually paler, petiole socket area often brownish, closing face of femora often brownish, midtarsomere I often brownish or whitish, and hindtarsomere I often white except for apex (tarsomeres I-II whitish on all legs in male from Mato Grosso, Brasil). Terga I-III either with translucent apical band or I or I-II or I-III with white or creamy yellow apical bands; sternum I, tergum I dorsobasally and its laterotergite often reddish brown. Metallic setae of face (appressed setae sparse on female clypeus except laterally), gena and propodeum silvery (sometimes golden on gena and propodeum).

Female clypeus with snout-like projection beneath free margin and weak tooth lateral to it, apex of snout often narrowly notched (figs. 204-207) but sometimes snout broad with wide, shallow emargination (figs. 209-210); margin of female clypeus lateral to tooth thick in ventral view but attenuate laterad (fig. 208); male clypeus with three similar stout teeth, middle one longest (fig. 211), clypeal margin in ventral view thicker laterally than in female (fig. 212). Flagellomeres III-V or VI with linear tyli in male (figs. 213-214). Female UID usually 0.60-0.69X LID, but 0.70-0.74X LID in exceptional forms (n Argentina, s Brasil); male UID 0.75-0.86X



LID. Female OOD usually 0.40–0.57X HOD, but in most specimens from southern part of range (s Brasil) OOD 0.60–0.69X HOD, and in material from northern fringe of range (Mexico) OOD 0.60X HOD; OOD rarely only 0.33–0.38X HOD (Trinidad, Peru); male OOD usually 0.75–0.85X HOD, but 0.69X HOD in specimen from Caceres, Brasil. Occipital carina ending on hypostomal carina just laterad of its apex. Anterodorsal pit of pronotum transversely elongate, deep, as long as or longer than hindocellus diameter. Tegula completely punctate. Male sternum VIII as in fig. 220. Male genitalia as in figs. 215–219, midventral lobe of gonostyle bent laterad in ventral view (figs. 216–218), tip of aedeagus expanded (figs. 217–218).

Length 8–10 mm (female), 7–8 mm (male).

#### Discussion:

Pison cameronii is a wide ranging, commonly collected species. The snout-like projection beneath the clypeal rim is the most diagnostic feature in the female (figs. 204, 206), but it is subject to some variation. In occasional specimens from Colombia and Brasil the snout is wide and shallowly emarginate (fig. 209). The incomplete occipital carina, i.e., ending on the hypostomal carina, is an additional feature of the species although not unique to it. Males can be recognized by the clypeal teeth and the presence of linear tyli on flagellomeres III–V or VI (fig. 213). The genitalia are also diagnostic: the tip of the aedeagus is expanded, and the midventral lobe of the gonostyle is directed laterad (figs. 216–218). On the basis of its genitalia, cameronii may be most closely related to arachniraptor, brasilium and maculipenne.

Sometimes the propodeal dorsum and interface between the side and hindface is densely covered with gold setae, and such specimens resemble chrysops. The female clypei (compare figs. 204, 206, 209 & 149–151) differ however, and most specimens of chrysops have a broader ocellocular distance. The antennal tyli of male cameronii separates that sex from males of chrysops.

The upper interocular distance varies in relation to the lower interocular distance as indicated in the description, and is not a usable species character. The UID is broadest in females from the southern end of the distribution of cameronii: northern Argentina and southern Brasil, especially Nova Teutonia. The variation in the length of the ocellocular distance lessens its value as a diagnostic tool. Its variation is more random than the UID, but there is a definite tendency for the OOD in females to be broad in material from the extreme ends of the range (Mexico and southern Brasil).

I have examined the type. It is labeled simply "Am. A." In his original description Kohl stated that the specimen came from Mexico or Peru but his evidence was not given.

#### Range:

Southern Mexico to Colombia and Trinidad, widespread in South America where cameronii occurs as far south as Uruguay and northern Argentina.

Material examined (141 females of which 88 are from Nova Teutonia, Brasil, 8 males):

MEXICO, Chiapas: Palenque, 100 m (PMA); Muste, 440 m, nr. Huixtla (CNC). EL SALVADOR: Los Chorros (UCD). COSTA RICA: Golfito (USNM); Palmar (USNM); San José, San Antonio de Escazu (COOPER). PANAMA, Canal Zone: Barro Colorado I. (USNM, AMNH). COLOMBIA, Caqueta: Yuruyaco, 73 km sw Florencia (BMNH); Narino: Barbacoas, 50 m (COOPER); Meta: La Macarena (BMNH); Putumayo: Mocoa, 600 m (BMNH), Villa Garzon, 8 mi. s Mocoa (BMNH); Boyaca: Muzo, 900 m (AMNH), Valle: Cali, 900 m (BMNH), Vaupes: Miraflores, 400 m (BMNH). ECUADOR, Napo: Muyuna, 5 km w Tena (BMNH); Morona-Santiago: Cord. de Cutucu, 6 km e Macas, 1100 m (COOPER), Taisha, 500 m (COOPER); Pichincha: Rio Palanque Res. Sta., 250 m (PMA). PERU, Loreto: Pucallpa (BMNH); Madre de Dios: Avispas, 400 m (MCZ). BOLIVIA, Beni: Río Itenez at mouth of Río Baures (AMNH), Río Mamore at mouth of Río Ibare (AMNH); Santa Cruz: Est. Experimental Gral. Saavedra (LILLO). PARAGUAY: Sommerfeld (LILLO). ARGENTINA, Salta: Pocitos (FRITZ), Corrientes: Las Marias, Ca. Virasoro (LILLO), Ytuzaingo (FRITZ). TRINIDAD: Maracas Valley (BMNH). GUYANA: Wismar (AMNH). BRASIL, Pará: Belém (VIENNA); Bahia: Cepec,



Itabuna (BMNH); Mato Grosso: Cáceres (AEI), Itaum (AEI); Sao Paulo: Caraguatatuba (FRITZ); Guanabara: Rio de Janeiro (USNM), Represa do Rio Grande (AEI); Rio de Janeiro: Conceição de Macabu (AEI); Santa Catarina: Nova Teutonia (AEI, USNM, LECLERCQ, UCD, MCZ, CU, OSU, KU). URUGUAY, Tacuarembó: 40 km nw Tacuarembó (AMNH).

Pison dementia Menke, n. sp.  
(Figs. 221-229)

Description, holotype female:

Infumation of forewing restricted to marginal cell, membrane lightly brownish. Body black except: mandible reddish brown except basally; pronotal lobe, tegula, apex of coxae, and lower surface of trochanters, femora and tibiae yellowish brown; laterotergites I-II yellow brown. Clypeus laterally, lower frons, gena, top of pronotal collar, scutal flange, and metanotum laterally with dense, appressed silver setae; propodeum with suberect pale gold setae that are densest on dorsum and along interface between side and hindface. Terga I-III with with broad, apical creamy yellow bands, IV-V translucent apically.

Clypeal margin without median lobe, margin with round notch and two weak teeth lateral to it (similar to fig. 221), polished rim broadened behind notch and teeth, clypeal margin narrowly thickened in ventral view (similar to fig. 222). UID 0.91X LID. OOD 1.11X HOD. Occipital carina incomplete ventrad, ending short of hypostomal carina apex. Pronotum with transversely elongate anterodorsal pit, its length greater than hindocellus diameter. Tegula completely punctate. Tarsi apparently without plantulae.

Length 8.5 mm.

Variation in females (7 specimens):

Infumation of forewing leading edge sometimes extending basad from marginal cell; legs sometimes mostly black with only lower surface of mid and hindfemora yellowish brown; appressed facial and genal setae sometimes golden; pair of teeth lateral to clypeal notch sometimes poorly or not differentiated; UID 0.86-0.91X LID; OOD 1.02-1.29X HOD; forewing media often interstitial with crossvein cu-a or nearly so; length 7-8.5 mm.

Male (2 specimens):

As in female except: marginal cell only faintly infumate; antenna sometimes yellowish brown beneath to tip and palpi and mid and hindtarsomere I sometimes yellowish (Bahia); clypeal margin with short, median tooth and lateral sinuation (fig. 223); flagellum simple; UID 0.98-1.0X LID; OOD 1.17-1.51X HOD; sternum VIII similar to maculipenne; genitalia as in figs. 225-229, midventral lobe of gonostyle broad, its apex curled (figs. 225, 227); length 5.5-7 mm.

Discussion:

The clypeus is distinctive in both sexes of dementia (figs. 221, 223). The very broad upper interocular distance (UID usually almost as broad as LID) and ocellocular distance (OOD about equal to HOD or up to 1.5X HOD) are additional recognition features of the species. The male genitalia are diagnostic (figs. 226-229).

Range:

Known only from eastern and southeastern Brasil.

Types:

Holotype female: BRASIL, Santa Catarina: Nova Teutonia, II-24-1964, Fritz Plaumann (UCD).

Paratypes (8 females, 2 males): BRASIL, Bahia: Itapetincá, 300 m, XI-69, F. M. Oliveira (AEI); Guanabara: Rio de Janeiro, I-39, R. C. Shannon (USNM); Sao Paulo:



Gália Est., VII-1984, F. M. Oliveira (AEI), Sao Paulo, VII-4-77, V. Alin (MLSU); Santa Catarina: Nova Teutonia, various dates, F. Plaumann (UCD, MCZ).

#### Etymology:

The name dementia, noun in apposition, is the Latin word for insanity. The combination Pison dementia names a condition that will afflict anyone who, in the future, decides to do further work on the Neotropical species of the genus, particularly in the cressoni group.

#### Pison abothrum Menke, n. sp. (Figs. 230-238)

#### Description, holotype female:

Infumation of forewing leading edge uniformly brown, wing membrane pale brownish behind. Following parts yellowish brown: scape, pedicel, flagellomere I, clypeus except near antennal socket, mandible (apex darker), labrum, palpi, pronotal lobe, tegula, propodeal side above mid and hindcoxae, rim of petiole socket, precoxal lobe, metasternum, legs except coxae dark above, gastral segment I except distal half of tergum black, and laterotergite II. Gaster without creamy yellow tergal bands. The following with dense, appressed gold setae: clypeus and lower half of frons and narrowly along inner orbit to level of ocelli, gena, and top of pronotal collar; setation of rest of thorax including legs similar or paler, longest on propodeum. Tergum I setae brownish gold, but setation of rest of gaster brownish.

Clypeal margin with median lobe that is depressed below surface of clypeus, lobe almost as wide as clypeus, its margin obtusely triangular (fig. 230), its surface smooth, asetose, edge of lobe thin in ventral view. UID 0.67X LID. OOD 0.56X HOD. Occipital carina incomplete ventrad, ending near apex of hypostomal carina. Pronotum without anterodorsal pit. Media of forewing diverging from M+Cu before crossvein cu-a. Tegula sparsely punctate on outer half. Tergum II more convexly swollen in lateral profile than tergum III. Tarsi apparently without plantulae.

Length 10 mm.

#### Variation in female (one specimen):

Body more extensively yellowish brown: flagellomere II (III reddish brown), clypeus entirely, ventral margin of pronotum, scutal flange, metanotum laterally, mesopleuron except venter, metapleuron, propodeal side, propodeal hindface extensively, mid and hindcoxae entirely, tergum I entirely except for small brown spot near hindmargin, base and margins of tergum II, lateral margin of tergum III, and sternum II except for transverse brown spot near hindmargin. Setae of gaster paler. OOD 0.60X HOD. Length 9 mm.

#### Male (one specimen):

As in female except: following yellowish or yellow brown: scape, pedicel, flagellomeres I-III, lower half of clypeus (lobe dark), mandible, labrum, palpi, pronotal lobe, tegula, scutal flange, hypoepimeral area of mesopleuron, metapleuron, propodeal side, legs except forecoxa, and gastral segment I (except tergum with tiny brown spot near hindmargin). Appressed facial setae a mixture of gold and silver. Clypeus with small median lobe with rounded tooth at middle (fig. 231); clypeal margin thickened (ventral view, fig. 232). Flagellum simple. UID 0.82X LID. OOD 0.73X HOD. Media of forewing almost interstitial with crossvein cu-a. Tergum II not appreciably more convex than III. Sternum VIII narrow (fig. 238). Genitalia as in figs. 233-237, aedeagus with apicoventral lobe (fig. 233), midventral lobe of gonostyle broad, but narrowing to small rounded apex (fig. 235). Length 7 mm.

#### Discussion:

Pison abothrum has a number of distinctive features. The absence of a pronotal pit separates the species from all others in the cressoni group except aranevorax



which has only two submarginal cells in the forewing. The divergence of the forewing media before crossvein cu-a is shared with only one other species in the group, brasilium, but the latter has broader ocellocular and upper interocular distances. Tarsal plantulae appear to be absent in abothrum. Other species of the cressoni group (except aranevorax, dementia and phthinylla) have these at least on hindtarsomere IV. The female clypeal lobe of abothrum is unusual and diagnostic (fig. 230). In the male the broad midventral lobe of the gonostyle is unusual among cressoni group species, as is the shape of the aedeagus in lateral profile (figs. 233, 235).

Pison abothrum is similar to martini in color pattern (legs almost totally yellowish, gaster without yellow bands, etc.), and the female of abothrum has a somewhat humped tergum II like the latter species. However martini has a deep pronotal pit and the media diverges after crossvein cu-a.

The male that I associate with the two Colombian females of abothrum is from Mato Grosso, Brasil. It does not have a pronotal pit, the forewing media diverges before crossvein cu-a (just barely), tarsal plantulae are absent, and it has the same color pattern as the females. Thus I am confident that the male and two females are conspecific.

Range:

Known only from Colombia and Mato Grosso, Brasil.

Types:

Holotype female: COLOMBIA, Putumayo: Villa Garzon, 400 m, X-17-1984, M. Cooper (BMNH).

Paratypes (one male, one female): COLOMBIA, Meta: La Macarena, XI-1976, M. Cooper (BMNH). BRASIL, Mato Grosso: Sinop, 12° 31' S, 55° 37' W, II-1976, M. Alvarenga (AEI).

Etymology:

The Greek word bothros means pit. The name abothrum, based on that word, means without a pit, a reference to the absence of a pronotal pit in this species.

Pison aranevorax Menke, n. sp.

(Figs. 239-248)

Description, holotype female:

Infumation of forewing leading edge darkest on marginal cell, membrane clear. Body black except: scape beneath, palpi, hindmargin of pronotal lobe, tegula and foretibia yellowish brown; tergal apices and lateral margins pale, translucent (no yellow bands). Clypeus laterally with appressed silver setae; lower frons and gena with appressed pale golden setae.

Clypeal margin with short median lobe (fig. 239) that has median projection, edge only slightly thickened in ventral view (fig. 240). Mandible slender in anterior view (fig. 239). UID 0.65X LID. OOD 0.37X HOD. Occipital carina incomplete ventrally, ending just short of hypostomal carina apex. Pronotum without anterodorsal pit. Tegula sparsely punctate on outer half. Forewing with only two submarginal cells, the reduction obtained by the loss of the outer veinlet of true II; recurrent vein I interstitial between submarginals I-II; tarsi apparently without plantulae.

Length 7 mm.

Variation in females (8 specimens):

Forewing membrane sometimes lightly infumate behind foremargin; scape entirely yellowish brown, or entirely black; legs entirely black or more extensively yellowish brown: tarsomeres I-II of mid and hindleg and apical fourth of mid and hindfemur ventrally; clypeal lobe sometimes strongly tridentate, middle tooth cuplike beneath (figs. 241-242), clypeal margin often more strongly thickened than in type



(ventral view); UID 0.54–0.64X LID; OOD 0.25–0.38X HOD; pronotum sometimes with weak, transversely elongate, anterodorsal pit; recurrent vein I sometimes ending near apex of submarginal cell I, sometimes ending on submarginal cell II; length 6.5–8 mm.

Male (two specimens):

As in holotype except: tarsomere I on mid and hindleg pale, basal fourth of mid and hindtibiae yellowish brown; clypeus with short, three-toothed lobe (fig. 243); flagellum simple; UID 0.65–0.67X LID; OOD 0.40–0.44X HOD; sternum VIII similar to maculipenne (fig. 176); genitalia as in figs. 244–248, midventral lobe of gonostyle broad, its ventral edge curled (figs. 244–246), aedeagus laterally compressed at apex, its tip broad, angular (figs. 244, 247); length 6 mm.

Discussion:

The presence of only two submarginal cells in the forewing separates aranevorax from other species of the ressoni group except erebus and phthinylla. The female clypei differ however (compare figs. 239, 241 & 160, 249), and erebus has a broader ocellocular distance. P. aranevorax has a normal tergum II and largely black legs, while phthinylla has a strongly humped tergum II, largely yellowish brown legs, a largely yellowish brown tergum I, and a deep anterodorsal pronotal pit. The propodeum of aranevorax is short with a fairly steep hindface, but in phthinylla it is elongate with a gradually sloping hindface (fig. 252). The compressed, angular aedeagus of aranevorax is distinctive (figs. 244, 247).

The holotype, one male and one female paratype were reared from the same nest by Martin Cooper, and are assuredly conspecific. However, six of the nine females display puzzling variation in the clypeus (one of two specimens from Leticia, Colombia, and material from Mitu, Colombia, Ecuador, Peru and Brasil). The clypeal lobe is more strongly dentate in these (fig. 241), the polished lip is bordered above by a fine, sharp impression, and these females also have a weakly developed anterodorsal pit on the pronotum. The female from Ecuador (Santiago) was captured at a nest from which a male emerged. The genitalia of this male are identical with those of the male from Barbacoas, Colombia. Their clypei are also identical. Thus I assume that only one species is represented by the material before me.

Range:

Known only from Colombia, Ecuador, Peru, and eastern Brasil.

Types:

Holotype female: COLOMBIA, Narino: Barbacoas, 80 m, I-2-1972, ex nest #3, M. Cooper (BMNH).

Paratypes (8 females, 2 males): COLOMBIA, Narino: same data as type; Amazonas: Leticia, VIII-19/23-74, M. Cooper (BMNH); Vaupés: Mitu, V-11-74, M. Cooper (BMNH). ECUADOR, Napo: Archidona, 500 m, IV-9-81, M. Cooper (COOPER); Morona-Santiago: Santiago, 300 m, VII-27-87, biology note 30, M. Cooper (COOPER). PERU, Huanuco: Monson Valley, Tingo Maria, IX-23-54, Schlinger and Ross (CAS). BRASIL, Bahia: Itabuna, II-17-85, F. P. Benton (BMNH).

Etymology:

The name aranevorax is based on the Latin words aranea (= spider) and vorax (= gluttonous). It refers to the exclusive use of spiders as a larval food source.

Biology:

Martin Cooper reared the Barbacoas material (1 male, 2 females) from a single mud nest that was built on the under side of an oblique substrate. Cooper's brief notes (BMNH) include crude sketches of the nest. The nest apparently consisted of 8 vertical mud tubes that were surrounded by mud "flanges". Four of the tubes were sealed. Two of the open tubes contained a sealed cell, one of which contained a cocoon with larva inside, a possible parasitic larva on the outside of the cocoon, and the remains of spiders.

Cooper also found a nest in Santiago, Ecuador (biology note 30). This nest was



attached to the underside of the leaf of an epiphytic plant. It consisted of two rows of cells (3 and 5 cells respectively). The more or less vertical cells projected from basal layers of mud. A male was reared from the nest and Cooper captured a female at the nest. A chalcidoid wasp was also obtained from the nest.

Pison phthinylla Menke, n. sp.  
(Figs. 132, 249-252)

Description, holotype female:

Infumation of forewing leading edge brown, restricted to marginal cell and outer third of submarginal I, wing membrane pale brownish elsewhere. Following body parts yellowish brown: scape, pedicel beneath, labrum, palpi, mandible except apex dark, pronotal lobe, tegula, fore and midlegs except coxa, hindleg except coxa dark above, gastral segment I except tergum with small dark brown spot just behind spiracle, sternum II; remaining terga and sterna brown but pale margined. Lower frons, clypeus laterally, and procoxa with dense appressed gold setae; setation of rest of body mostly sparser, yellowish brown or brownish, longest on propodeum.

Clypeal margin with median lobe that has semicircular emargination, surface of lobe smooth and descending laterad below clypeal margin (similar to fig. 249); edge of lobe thickened in ventral view (similar to fig. 250). UID 0.57X LID. OOD 0.38X HOD. Occipital carina incomplete ventrally, ending just short of hypostomal apex. Anterodorsal pit of pronotum transversely elongate, sharply delimited anteriorly but not posteriorly. Tegula completely punctate although sparsely so on outer half. Propodeal dorsum with fine median longitudinal carina; propodeal hindface meeting dorsum at a broad obtuse angle (side view, similar to fig. 252). Forewing with only two submarginal cells due to loss of outer veinlet of second submarginal cell (similar to fig. 132). Tarsi apparently without plantulae. Thorax and gaster elongate, tergum I length (measured in dorsal view) 1.25X apical width; tergum II swollen in lateral profile, in contrast to tergum III (similar to fig. 251).

Length 10.5 mm.

Female variation (1 specimen):

UID 0.56X LID. OOD 0.32X HOD. Length 9.5 mm.

Male:

Unknown.

Discussion:

Pison phthinylla is similar to two other species with pale legs, martini and abothrum, but the presence of only two submarginal cells and the shape of the female clypeus are immediately diagnostic. Tergum II is more strongly humped in phthinylla than in martini. The propodeum of phthinylla is elongate in side view, the angle formed by the hindface and dorsum being a broad obtuse angle (fig. 252). The angle is less in martini.

Pison aranevorax and erebus also have only two submarginal cells but they differ from phthinylla in a number of ways (see aranevorax and erebus).

Range:

Known only from Ecuador.

Types:

Holotype female: ECUADOR, Morona-Santiago: Cord. de Cutucu, 6 km e Macas, 1,100 m, V-21-1981, M. Cooper (COOPER).

Paratype (one female): same data as type except 1000 m, X-27-78 (BMNH).

Etymology:

The Greek word phthinylla, a noun in apposition, means a thin or delicate woman, a reference to the elongate form of the species.



Chilense Group  
(Figs. 253–267)

Description:

Head, thorax and coxae, trochanters and femora beneath with long, erect setae. Labrum quadrangular. Female mandible with weak tooth at middle of cutting edge, male mandible without tooth. Clypeus with prominent median lobe whose edge is not thickened. Occipital carina incomplete ventrally, ending just before hypostomal carina. Pronotum with anterodorsal pit, but no lamella. Pronotal collar about as thick as metanotum, about as high as scutum. Lateral flange of scutum narrow. Tegula impunctate on outer half. Propodeum entirely striatopunctate or ridged, but without crenulate ridge at top of side. Propleuron punctate. Episternal sulcus curving forward ventrad, attaining anterior margin of pleuron. Hindcoxa with inner dorsal carina, outer carina complete or only with apical remnant. Tarsomeres spinose apically, claws normal; hindtibia with few short, stout setae scattered over outer surface. Forewing media diverging before or after crossvein cu-a; marginal cell acuminate distally although somewhat bluntly so in chilense; three submarginal cells present, III not strongly narrowed on marginal cell; termination of recurrent veins variable. Hamuli of hindwing more or less divided into two groups. Margin of tergum I single-edged; tergum VII of male truncate apically. Male sternum VIII ending in two prongs. Male genitalia complex: gonostyle with long setae on outer (lateral) surface, and two ventral lobes (figs. 258, 264); volsellar lobes feebly setose; aedeagus with well defined head, but no ventral tooth or spine.

Included species:

Pison chilense and sylphe.

Discussion:

The main features of the chilense group are: the long, erect body setae, the many propodeal carinae, the absence of a crenulate ridge at the top of the propodeal side, the emarginate and pronged male sternum VIII, and the complex gonostyle of the male genitalia (with accessory lobes). The last two features are apomorphies. The long, erect body setae and tergal fasciae may be additional apomorphies. Pison chilense has tarsal plantulae, but these are apparently absent in sylphe. The closest allies of the chilense group, which appears restricted to the Andes, may be found in Australia based on material that I have seen from that continent.

Pison chilense Spinola  
(Figs. 253–254, 256–260)

Pison chilense Spinola, 1851:326. Syntypes, male and female: "Coquimbo" and "Santiago", Chile (TURIN).

Pison chilense, Janvier, 1928:87. Biology.

Pison chilensis, Casolari and Moreno, 1980:114. Lists three syntypes from "Chili".

[Notes taken by R. M. Bohart in 1960 during a visit to the museum in Turin indicate that there are 2 males and 1 female].

Description:

Margin of labrum slightly arcuate or straight in female, slightly concave in male; edge of female clypeal lobe arcuate, surface smooth, shiny; male clypeal lobe triangular, surface smooth, shiny; flagellomeres II–IV of male antenna swollen beneath, flagellomeres I–IX each with depressed linear placoid beneath that become progressively smaller toward article IX which only has tiny circular placoid; pronotum with anterodorsal, transverse pit whose length is about three-fourths distance across hindocelli, pit overlain by lamella anterad; propodeum entirely striatopunctate, obliquely so dorsally, transversely so on hindface, dorsum without median longitudinal



carina; outer carina of hindcoxa restricted to apical remnant; forewing media interstitial with cu-a or diverging from M+Cu before it; marginal cell apex bluntly acuminate (fig. 253); submarginal cell II occasionally incomplete through loss of either inner or outer veinlet; first recurrent vein of forewing ending on submarginal cell I or II, or interstitial between I and II, second recurrent vein ending on III; tergum VII of male truncate or even concave; sternum VIII as in fig. 254; gonostyle with setose midventral lobe whose upper end projects laterad as a horn (figs. 256, 258), and a more basal lobe that is scimitar-like in ventral view (fig. 259), and has patch of stout setae basally (fig. 257), outer surface of gonostyle setose, dorsal edge with few widely spaced long, sinuate, stouter setae (fig. 260); volsellar lobes angular in ventral view (fig. 259).

#### Discussion:

This commonly collected Chilean and Argentinean endemic is easily recognized by its large size (8–11.5 mm long), the amber tegulae and wing veins (at least basally), the long dark erect setae of the head and thorax (including the coxae, trochanters and femora), and the broad silver fasciae of terga I–III. The tergal fasciae give chilense the appearance of the genus Tachytes. The face and top of the pronotal collar are covered by dense appressed silver setae and this type of setation also occurs on the mesopleuron just beneath the scrobe, on the gena, and on the outer surface of the femora.

I have not studied the Spinola's syntypes but have read R. M. Bohart's notes on them taken during his visit to the museum in Turin in 1960. His notes and Spinola's description are sufficient to positively identify chilense.

#### Range:

Chile between 30°–37° latitude (Coquimbo Prov. to Concepcion Prov.) and the provinces of Tucuman and Neuquen in Argentina. Records from Argentina are few but they suggest that chilensis probably occurs in the Andes from Tucuman to Neuquen.

#### Material examined (482 specimens):

CHILE, Coquimbo: 8 km n San Pedro DeQuile (MCZ); El Panque (MCZ); Tongoy (MCZ); Ovalle (MCZ); Hda. Illapel, 900–1200 m (OSU). Aconcagua: Cta. El Melon (MCZ). Valparaiso: El Salto (BMNH, MCZ); Galalea (ZMC); Valparaiso (MCZ); La Campana nr Limache (MCZ). Santiago: Queb. de La Plata, La Rinconada, Maipu (LILLO, CAS); Peñalolén (BMNH); Limache (BMNH); 20 km e Santiago (ZMC); Apoquindo (LILLO, MCZ); Olivicura (MLSU); Quebrada El Peumo (MLSU, KU, MCZ, OSU); Quebrada S. Ramon (MLSU); 5 km e Cuesta de Ibaché (CAS); Camelo (LILLO, KU); El Canelo (OSU); Curicavi (OSU); Nido de Aguila (OSU). O'Higgins: La Leonera (MCZ). Colchagua: 3 km n Callejones (CAS). Maule: Forel Carrizalillo (USNM); Cauquenes (BERLIN). Nuble: 17.5 km s Curanipe (USNM). Concepcion: Concepcion (BMNH). Province unknown: Nido de Aguila (MCZ); Olmué (BMNH); Tonlema (KU); Estero del Tempo (KU); Margamarga (MCZ); Illapel (MCZ). ARGENTINA, Tucuman: Tafi del Valle, La Quebradita (LILLO). Neuquen: Collon Cura (LILLO).

#### Biology:

Janvier (1928) described and illustrated the nest of chilense. The species is a ground nester, excavating burrows in stream banks. The soil is moistened with water from the adjacent streams to facilitate excavation. Cells are arranged in linear fashion and each is separated by a wall of mud.

Pison chilense has long, erect setae on the gena, propleuron, and ventral surface of the forecoxa, trochanter and femur. The mid and hindlegs of chilense also have long setae on the trochanter and femur. The lower and upper surfaces of the mandible have a linear series of long setae set in grooves. This vestiture (except on the mandible) is scattered and may not be identical to the psammophore described by Evans (1981) on some Australian ground nesting species of the genus.



Pison sylphe Menke, n. sp.  
(Figs. 255, 261-267)

Description, holotype female:

Black, wings slightly infumate. Erect setae of body pale; lower frons and clypeus with appressed silver setae; terga I-IV with broad silver fasciae.

Margin of labrum entire. Clypeus with triangular median lobe (fig. 261). Frons weakly swollen, dull, no obvious punctation. Eye length 0.94X distance between eye notches; UID 0.59X LID; OOD 0.40X HOD. Flagellomere I length 3X apical width, II-III slightly less than 3X, IX slightly longer than wide.

Pronotum with very small, transversely elongate anterodorsal pit (half hindocellus diameter). Scutum dull, imbricate, shallowly punctate, punctures one to two diameters apart, closer than that anteriorly. Scutellum flattened, weakly shiny, imbricate, punctate, punctures more well defined than those of scutum. Propodeum entirely covered by closely spaced, fairly regular ridges (fig. 263), interspaces smooth, impunctate, shiny, ridges on dorsum longitudinal and continuing onto hindface where they converge toward midline, ridges on propodeal side oblique and curving onto hindface. Mesopleuron weakly shiny, more coarsely, sharply punctate than scutum, punctures one-half to two diameters apart.

Forewing media diverging after cu-a. Both recurrent veins ending on submarginal cell II.

Hindcoxa with complete but low outer carina on dorsal surface. Terminal tarsomeres and claws missing on all legs, tarsal plantulae apparently absent.

Gaster weakly shiny, closely, finely punctate.

Length 9 mm.

Male:

As in female except: fasciae on terga II-IV weaker than that on I. Labrum with slight indentation. Clypeal lobe quadrangular but with small, median tooth (fig. 262). Frons with shallow but well defined punctation, punctures mostly one diameter apart. UID 0.72X LID; OOD 0.82X HOD. Flagellomere I length 3X apical width, II 2.5X apical width, III 2X apical width, IX slightly longer than wide. Ridges of propodeal dorsum slightly divergent toward apex, middle ridge straight, stronger than others; ridges of dorsum not continuing onto hindface in convergent manner, hindface with many cross-ridges, the uppermost of which are continuous with those on propodeal side, ridges of propodeal side changing to striatopunctation ventrad. First recurrent vein interstitial between submarginals I-II on right wing. Sternum VIII as in fig. 255. Genitalia as in figs. 264-267. Length 7.5 mm.

Discussion:

The many closely spaced carinae with impunctate intervals on the propodeal dorsum, and the black body with pale erect hair immediately identify sylphe. The shape of the clypeal lobe in both sexes, the absence of tarsal plantulae, the simple male flagellum and complex genitalia are also diagnostic. The volsellar lobes are rounded in ventral view (fig. 266) and the basalmost lobe of the gonostyle extends laterad as a sharp point in ventral view (fig. 266).

Range:

Known only from northern Peru at elevations above 4800 feet (1500 m).

Types:

Holotype female: PERU, Cajamarca: Cajamarca, 2700 m, III-1942, W. Weyrauch (LILLO).

Paratype male: PERU, La Libertad: Samne, ca. 40 km ne Trujillo, 1500 m, VII-12/17-75, Porter and Stange (LILLO).



Etymology:

The name sylphe, a noun in apposition, is based on the French word sylphe which means "a fairylike spirit of the air".

**Convexifrons Group**  
(Figs. 5, 268-291)

Description:

Frons swollen (inflated); eye asetose; male antenna simple, flagellum without tyli or other modifications; mandible with posterior notch (fig. 5), female mandible with mesal tooth or cleft on cutting edge; lower half of female clypeus with long, somewhat decumbent setae that project over clypeal margin forming a "brush"; female clypeal lobe triangular or quadrangular; male clypeus with polished, triangular, median lobe (fig. 271); labrum quadrangular, apex entire or with obtuse emargination; occipital carina incomplete ventrad, ending on or near hypostomal carina; anterior edge of pronotum with polished plate-like area at middorsum that is not free (fig. 288), with deep, transversely elongate depression behind it that has sharp hindmargin (fig. 288); scutal flange broad, somewhat reflexed; tegula impunctate on outer half, punctate adjacent to scutum; propodeal side delimited dorsad by crenulate ridge (figs. 268-269); propleuron punctate, disk not largely polished; metapleural flange narrower than hindocellus diameter; tergum I apex single-edged; forewing media diverging from M+Cu after crossvein cu-a; marginal cell acuminate distally; forewing with three submarginal cells, III strongly narrowed toward marginal cell, its veinlets often joining there or even forming petiole; first recurrent vein ending on submarginal cell I or II, second ending on submarginal II or interstitial between II-III; hamuli of hindwing divided into two groups; male foretrochanter without spine; anterior claw of male foreleg normal, not distorted; dorsum of hindcoxa usually delimited by complete outer and inner carinae, inner carina usually lamelliform in part; tarsomeres III-IV, or IV with plantulae; gaster without yellow tergal bands; male tergum VII simple, not laterally compressed; male sternum VII simple, VIII broadly concave apically (fig. 278); genitalia somewhat laterally compressed, gonostyle elongate, setose, usually with midventral spine or finger-like lobe (figs. 273, 282), volsellar lobes small (figs. 274, 290).

Included species:

Pison convexifrons, cooperi, longicorne, wasbaueri.

Discussion:

The main features of this group, all of which are apomorphies, are the mandibular notch; the swollen frons; the non-lamelliform polished area at the top of the pronotum that does not extend very far laterally; the deep, transverse depression behind it; the propodeal ridge; and the apically emarginate male sternum VIII.

Three species, convexifrons, cooperi and wasbaueri, are very similar structurally and form a monophyletic unit within the convexifrons group. The propodeal hindface of these species is cross-carinate (figs. 268-269), the antennal flagellomeres are about 2X as long as wide and the outer ones are much shorter, the female clypeal lobe is triangular, the female labrum is emarginate, and the gonostyle of the male genitalia has a spinose process ventrally (figs. 273, 277, 282). Although the three are not strikingly different externally, the male genitalia are diagnostic.

The fourth species, longicorne, is unique in a number of ways. The propodeal hindface is largely smooth, the flagellomeres are 2.5 to 3.75X as long as wide and the articles remain long to the tip, the hindocellus is much farther from the eye than in convexifrons and its siblings, the pronotal collar has a prominent median elevation (fig. 288), the female clypeal lobe is roundly quadrangular, and the female labrum is not notched. The male genitalia lack a ventral spine on the gonostyle and the volsellar lobes are larger than in the convexifrons complex (fig. 290).



Wing venation, particularly the end point of the recurrent veins, varies within each species as indicated in the descriptions. The size and shape of submarginal cells II-III also varies, and in exceptional specimens the second is open through loss of a veinlet. In two species (some aureofaciale and some longicorne) the veinlets of submarginal cell III join at the marginal cell, and sometimes they join before meeting it, forming a petiole.

Pison convexifrons Taschenberg  
(Figs. 5, 268, 270-275)

Pison convexifrons Taschenberg, 1870:18. Lectotype female: Nov. Frib. (Nova Friburgo, Rio de Janeiro, Brasil), present designation (HALLE).

Description, male (2 specimens):

Body black, hindtarsus brownish. Appressed facial setae silver. Abdomen without silver fasciae.

Labrum quadrangular, obtusely indented. Clypeus as in fig. 271, frons weakly shiny, densely punctate. UID 0.73X LID. OOD 0.57X HOD. Flagellomeres I-IV 2X as long as apical width, V 1.33X as long as apical width, VI-X progressively shorter.

Scutum and scutellum dull, densely punctate, punctures less than puncture diameter apart. Propodeum shiny, dorsum with median, longitudinal carina that fades posterad, surface with many carinae that are oblique basally, but transverse on apical half, dorsum punctate laterally; hindface impunctate, but with coarse cross-carinae similar to those on dorsum; propodeal side with oblique or horizontal carinae dorsad, these changing to weak striatopunctation or simple punctation ventrad. Mesopleuron dull, densely punctate (mostly less than 1 diameter apart), punctures below scrobe coarser than those on scutum. Metapleuron finely, horizontally carinate above, finely punctate, shiny below. First recurrent vein interstitial or ending near base of second submarginal cell; second recurrent vein ending near apex of second submarginal cell or interstitial.

Sternum VIII apex broadly, shallowly concave (similar to fig. 278). Genitalia as in figs. 272-275; outer surface of gonostyle apex covered by long setae (fig. 272), ventral edge of gonostyle with curved fingerlike process at about midpoint (figs. 273-274).

Length 5 mm.

Female (18 specimens):

Similar to male except: tarsi black, terga I-II occasionally with silver fasciae laterally. Clypeus as in fig. 270. UID 0.50-0.60X LID. OOD 0.10-0.25X HOD. Flagellomere I length slightly more than 2X apical width. Transverse carinae of propodeal dorsum usually finer than in male (fig. 268), sometimes changing to striatopunctation laterally, or evanescent, median carina sometimes in broad trough. First recurrent vein ending near apex of 1st submarginal cell in half of the material, interstitial in the others; second recurrent vein usually ending near apex of submarginal cell II but occasionally interstitial between II and III (right and left wings of specimens sometimes different for both recurrent veins). Length 5.5-7.5 mm.

Discussion:

The cross-carinate propodeal dorsum (fig. 268) and male genitalia are the best diagnostic features of convexifrons. The species is similar to wasbaueri but the setae of the gonostyle are confined to an apical group in convexifrons (fig. 272). There are two groups of setae in wasbaueri (fig. 276), and the propodeal dorsum is only punctate. The two species are allopatric.

The cross-carinate propodeal dorsum of convexifrons separates it from cooperi. The latter species has a largely smooth dorsum (fig. 269), and the genitalia are different (compare figs. 272-275 & 281-284).

In several females the cross-carinae of the propodeal dorsum are evanescent



(Blumenau and Nova Teutonia, Brasil; Pirapo, Paraguay). I have seen normally carinate females from the same Brazilian localities, however. Nevertheless, these weakly carinate specimens are difficult to positively identify without associated males. Forewing venation is variable in convexifrons. The size and shape of submarginal cells II and III varies, and the end point of the recurrent veins may be different on the two wings of one individual as indicated in the description. The second submarginal cell is incomplete in one wing of one female.

Taschenberg (1870) described convexifrons from three female syntypes all of which I have examined. A lectotype label has been placed on one of the specimens from Nova Friburgo.

Range:

This wasp is known only from southeastern Brasil, eastern Paraguay and northeastern Argentina.

Material examined (18 females, 2 males):

BRASIL, Rio de Janeiro: Nova Friburgo (HALLE); Guanabara: Rio de Janeiro (HALLE); Santa Catarina: Nova Teutonia (UCD, LECLERCQ, MCZ), Corupa (AMNH), Blumenau (VIENNA). PARAGUAY: Pirapo (FRITZ). ARGENTINA, Entre Rios: Federacion (FRITZ).

Pison wasbaueri Menke, new species  
(Figs. 276-277, 279)

Description, holotype male:

Body black, tarsi brownish. Appressed facial setae silver. Abdomen without tergal fasciae.

Head same as convexifrons except UID 0.76X LID; OOD 0.71X HOD.

Thorax same as convexifrons except scutum weakly shining; propodeal dorsum with median longitudinal carina and short basal carinae, but rest of surface only punctate; first recurrent vein interstitial between submarginal cells I-II, second recurrent ending near apex of II.

Sternum VIII same as convexifrons. Apex of gonostyle with setae along outer ventral margin and cluster of setae distad of ventral spine (figs. 276-277).

Length 5.5 mm

Variation in males (2 specimens):

UID 0.72-0.77X LID; OOD 0.57X HOD in one specimen. First recurrent vein ending near apex of submarginal cell I in three wings, interstitial in the fourth, second recurrent interstitial or nearly so. Outer veinlet of third submarginal cell incomplete in one wing. Length 4.5-6 mm.

Female (1 specimen):

Same as female convexifrons except: UID 0.61X LID; flagellomere I length about 2.5X apical width; propodeal dorsum without transverse carinae or striatopunctation; first recurrent vein ending on submarginal cell I; length 5 mm.

Discussion:

The absence of cross-carinae on the propodeal dorsum of wasbaueri is the only external difference from convexifrons. The male genitalia of wasbaueri are distinctive: the setae of the gonostyle are divided into two groups, an apical one and another just distal to the ventral spine (figs. 276-277). The genitalia of wasbaueri offer the only reliable means of separating the species from males of cooperi (compare figs. 276-277 & 281-184). The single female of wasbaueri differs from most females of cooperi in having a uniform, dense punctation on the mesopleuron (fig. 279). In most females of cooperi the punctures are sparser beneath the scrobe and toward the mesopleural suture (fig. 280).



Range:

Known only from northwestern Argentina. The species has been collected at low elevation Andean localities in cloud forest/deciduous subtropical thornforest transition zones.

Types:

Holotype male: ARGENTINA, Salta: Rosario de Lerma, XII-24/27-1983, malaise trap, M. Wasbauer (CSDA).

Paratypes (2 males, 1 female): ARGENTINA, Salta: Yuto, I-11-66, H. & M. Townes (AEI); Tucuman: Horco Molle, Parque Sierra San Javier, 700 m, I-15-76, L. A. Stange (LILLO).

Etymology:

This species is dedicated to Marius Wasbauer, collector of the holotype.

Pison cooperi Menke, new species  
(Figs. 269, 278, 280-284)

Description, holotype male:

Body black. Appressed facial setae silver. Abdomen without tergal fasciae.

Head same as convexifrons except UID 0.67X LID; OOD 0.30X HOD; and flagellomere I length nearly 2.5X apical width.

Thorax same as convexifrons except surface of propodeal dorsum only punctate (similar to fig. 269), only with vestiges of basal and transverse ridging; propodeal side with few horizontal ridges beneath spiracle, but surface mostly punctate; metapleuron mostly punctate above; first recurrent vein interstitial in left forewing, ending near apex of first submarginal in right wing.

Sternum VIII as in figure 278. Gonostyle with setae confined to apex (like fig. 281), ventral spine unusually long, curved (like figs. 281-282).

Length: 5.25 mm.

Variation in males (3 specimens):

UID 0.63-0.69X LID; OOD 0.25-0.40X HOD. Flagellomere I length slightly more than 2.5X apical width. First recurrent vein received by second submarginal cell in specimen from Ega. Length 5-5.5 mm.

Female (58 specimens):

Similar to male except: terga I-II usually silvery fasciate at least laterally, III and IV occasionally weakly fasciate laterally. Clypeus same as convexifrons (fig. 270). UID 0.46-0.57X LID. OOD 0.20X HOD or less, occasionally nearly contiguous. Flagellomere I length 2.33-2.75X apical width. Punctuation of mesopleuron usually much sparser along mesopleural suture (2-5 diameters apart, or even impunctate) and sometimes beneath scrobe as well (fig. 280). Propodeal side punctuation sometimes evanescent. Most often first recurrent vein goes to submarginal cell I, and second goes to submarginal cell II (right and left wings sometimes different), but sometimes one or both recurrents interstitial. Length 4.5-6.5 mm.

Discussion:

The absence of cross-carinae on the propodeal dorsum of cooperi distinguishes it from the very similar convexifrons (compare figs. 268-269), although occasional specimens of cooperi have short cross-carinae along the median longitudinal carina. Male genitalia have to be examined to separate cooperi from wasbaueri (compare figs. 281-284 & 276-277). The long, curved spinose process of the gonostyle (fig. 281-282) is unique to cooperi. The process is much shorter in convexifrons and wasbaueri. An additional feature of cooperi is the generally sparser mesopleural punctuation toward the mesopleural suture. This varies, however, and some specimens are fairly uniformly densely punctate as in convexifrons and wasbaueri.



Evans' (1972) record of a Pison (Entomopison) sp. near convexifrons from Dominica refers to cooperi.

Range:

Pison cooperi, a commonly collected wasp, is known from Costa Rica, Panama, and the West Indian island of Dominica. It occurs widely across northern South America and reaches northern Bolivia in the west and central Brasil in the east.

Types:

Holotype male: COLOMBIA, Amazonas: La Chorrera, VIII-14/23-1976, M. Cooper (BMNH).

Paratypes (3 males, 57 females): COSTA RICA, Heredia: La Selva, 4 km se Puerto Viejo, VII-21-80, ex trap nest M620-C1 (female, emerged VIII-19-80) and C-2 (male, emerged VIII-18-80), R. E. Coville (USNM); Puntarenas: Pta. Morales, IX-10-87, W. E. Eberhard (COOPER). PANAMA: Cabima (now under the canal), V-28-11, A. Busck (USNM). DOMINICA: Clarke Hall Est., V-30-66, G. Steyskal (USNM); S. Chiltern, 1600', II-19-65, H. E. Evans (USNM). COLOMBIA, Amazonas: La Chorrera, VIII-14/23-76, M. Cooper (BMNH); Leticia, VIII-21/23-74, VIII-29/IX-2-74, M. Cooper (BMNH); El Encanto, IX-15/19-76, M. Cooper (BMNH); Boyaca: Muzo, 900 m, VII-36, J. Bequaert (MCZ); Magdalena: N. Sierra Nevada de S. Marta, Rio Buritaca, 100 m, II-23/24-74 M. Cooper (BMNH); N. Sierra Nevada de S. Marta, Rio Don Diego, XI-22-74, XII-3-74, M. Cooper (BMNH); Meta: Cord. Macarena, II-15/28-76, M. Cooper (BMNH); Villavicencio, V-7-74, M. Cooper (BMNH); Narino: Barbacoas, III-29-74, V-2/6-1976, VII-19/21-74, VIII-3-84, M. Cooper (BMNH, COOPER); Putumayo: Villa Garzon, 8 mi. s Mocoa, VII-22/23-78, IX-8-87, M. Cooper (BMNH, COOPER); La Hormiga near Mocoa, IX-6-78; Vaupes: Mitu, V-14-74, M. Cooper (BMNH). ECUADOR, Napo: Muyuna, 5 km w Tena, 500 m, IV-10-81, VIII-26-79, XI-24-78, M. Cooper (BMNH); Limoncocha, VI-15/28-76, S. & J. Peck (CNC), Limoncocha, VI-3-77, D. Vincent (USNM); Tena, 500m, IV-11/28-76, XII-9/14-71, M. Cooper (BMNH); Puerto Misahualli, 30 km e, 350 m, II-83, L. Masner, M. Sharkey (PMA); Misahualli, 1 hour down Río Napo, II-19-83, L. Huggert (PMA); Laguna Jatuncocha, 20 km s Nuevo Rocafuerte on Río Yasuni, II-5/7-86, Wojcicki pan trap, Finnamore, Thormin, Blades (PMA); Morona-Santiago: Rio Upano nr. Patuca, 570 m, VII-14-87, M. Cooper (COOPER). PERU, Huanuco: Monson Valley, Tingo Maria, X-21-54, Schlinger and Ross (CAS). BOLIVIA, Beni: Río Mamore, about 5 km nw mouth of Rio Grande, VIII-2-65, J. K. Bouseman (AMNH); Riberalta, XI-56, M. Fritz (FRITZ). TRINIDAD: St. Augustine, IX-4-49, E. Callan (BMNH). GUYANA: Mazaruni-Potaro Dist., Takutu Mountains, malaise trap, XII-3/10-83, Steiner and Spangler (USNM); Mazaruni, VII-19-37, VII-28-37, IX-7-37, IX-21-37, Richards and Smart (BMNH); Ryk-Over-Al, IX-17-37, Richards and Smart (BMNH); Blairmont, VIII-23, F. X. Williams (BPBM); Bartica, V-17-01 (CU). SURINAME: Coppename River, env. Voltz Mountain, VII-14-63, J. van der Vecht (LEIDEN). BRASIL, Amazonas: Ega (= Tefé) (BMNH). Goiás: Vila Vera, X-73, M. Alvarenga (AEI). Para: Belém, VI-24, F. X. Williams (BPBM); Pará (= Belém), X-26-01, A. Ducke (VIENNA). Rio Branco: Vista Alegre, IX-6-24 (CU).

Metatype (one headless female): SURINAME: Paramaribo, I-1961, P. van Doesburg (LEIDEN).

Etymology:

This wasp is dedicated to Martin Cooper, Pison collector extraordinaire.

Pison longicorne Menke, n. sp.  
(Figs. 285-291)

Description, holotype male:

Body black, mandible tip and tarsi brownish. Appressed facial setae silver. Terga I-III with silver apical fasciae.



Labrum quadrangular, apex with shallow obtuse V notch. Clypeus as in fig. 286; frons dull, densely punctate, with tiny polished area between midocellus and antennal sockets; UID = 0.80X LID; OOD 0.83X HOD. Antenna elongate, length of articles I–VI more than twice apical width (I 2.60X width), VII 2X apical width, VIII–X slightly less than 2X apical width.

Pronotal collar with angular median prominence (similar to fig. 288). Scutum and scutellum weakly shining, densely, finely punctate (punctures a diameter apart or less). Propodeum shiny, dorsum with sparse pin prick punctures (3 or more diameters apart) and extremely fine median longitudinal carina that is evanescent posterad; hindface smooth, impunctate except dorsad; propodeal side with dense, fine punctation similar to that on scutellum. Mesopleuron behind episternal sulcus shiny, moderately punctate (punctures 1–2 diameters apart). Metapleuron smooth, very finely punctate. First recurrent vein ending near apex of submarginal cell I, second recurrent vein ending at apical third of submarginal cell II.

Sternum VIII apex with deep, arcuate emargination. Genitalia as in figs. 289–291; gonostyle broad, flat, outer surface setose (fig. 289); volsellar lobes consisting of a pair of short, rounded structures fringed with setae (fig. 290).

Length 6.5 mm.

#### Variation in males (8 specimens):

Tarsi often black, appressed setae sometimes weakly golden. UID 0.72–0.85X LID. OOD varies from 0.66X to slightly more than HOD, but usually OOD 0.75X HOD or slightly more; single specimen in which OOD greater than HOD from Brasil, and is largest male. Flagellomere I length 2.5–3.5X apical width. Second recurrent vein nearly interstitial in most specimens, and is in one. Submarginal II incomplete in one wing of specimen from Guyana. Specimens from Argentina and Santa Catarina, Brasil have few feeble cross-ridges on propodeal hindface, but surface basically smooth, shiny. Median longitudinal propodeal carina extends to apex in two specimens. Length 6–8 mm.

#### Female (53 specimens):

Similar to male except: Legs completely black, flagellum sometimes brownish beneath; appressed setae varying from silver to brassy. Clypeal lobe truncate with corners rounded, its margin thickened (fig. 285). Labrum not notched. UID 0.56–0.72X LID. OOD 0.45–0.66X HOD. Flagellomeres longer, I 3.0–3.75X apical width, VII nearly 3X apical width. Punctuation of propodeal dorsum varies from sparse to moderately dense (1–2 diameters apart) and coarser; median longitudinal carina often strong, extending to apex; hindface usually punctate peripherally, often with weak transverse ridges interrupted at midline. Submarginal cell II sometimes very small, about equal to one hindocellus diameter. First recurrent vein rarely interstitial (s Brasil), second recurrent rarely interstitial (s Brasil, Panama), both recurrents end on submarginal II in one specimen (s Brasil). Terga I–III or IV with fasciae. Length 8–10 mm.

#### Discussion:

Pison longicorne is most easily recognized by the elongate antennal flagellomeres. All but the last are 3 or more times as long as wide in the female, and 2 or more times in the male. In other species of the convexifrons group the flagellomeres shorten progressively toward the antennal tip, and the outer articles are at most 2 times as long as wide in the female, less than that in the male. The largely noncarinate propodeal hindface, the angular median prominence of the pronotal collar (fig. 288), and the shape of the female clypeal lobe of longicorne (fig. 285) are distinctive within the convexifrons group. The male genitalia (figs. 289–291) are also diagnostic. In particular the gonostyle is broad and flat distally, the outer surface setose, and unlike other species in the group there is no spinose process ventrally (fig. 289). The volsellar lobes, though small, are larger than in other species of the group (fig. 290).



Range:

This commonly collected species occurs from northwestern Mexico to northern Argentina.

Types:

Holotype male: PARAGUAY: San Bernardino, October, K. Fiebrig (VIENNA).

Paratypes (9 males, 52 females): MEXICO, Jalisco: Plan de Barrancas, VIII-9-65, H. E. and M. A. Evans (MCZ); Chiapas: Palenque Ruins, VI-22-69, B. V. Peterson (CNC). COSTA RICA: Zent, III-1924, H. W. Atkinson (USNM); Turrialba, XII-?, Heyne (BERLIN); Golfito, XII-1948, P. and D. Allen (MCZ). PANAMA: Barro Colorado I., VII-14-39, V-1939, Zetek (USNM); Barro Colorado I., III-26-24, J. C. Bradley (CU). COLOMBIA, Vaupés: Mitu, V-17-74, M. Cooper (BMNH); Putumayo, Mocoa, V-31/VI-7-76, I-10-77, M. Cooper (BMNH); Villa Garzon, IX-1-84, M. Cooper (COOPER); Amazonas: La Chorrera, VIII-14/23-76, M. Cooper (BMNH). GUYANA: Kartabo, VII-26-24, W. Myers (CMP); 50 mi. point, Bartica-Potaro road, VIII-30-37, nest 160 & 160A, Richards and Smart (BMNH). SURINAME: Sipaliwini, VI-14-63, P. van Doesburg (LEIDEN). PARAGUAY: San Bernardino, K. Fiebrig (BERLIN); sw Saltos del Guaira, XII-8-71, L. Peña (AMNH). BRASIL, Guanabara: Reprúsa Rio Grande, X-1969, M. Alvarenga (AEI); Rio de Janeiro: Itatiaia, XI-16-39, Zikan (LILLO); Santa Catarina: Nova Teutonia, II, XI, XII, various years, F. Plaumann (MCZ, AMNH, CU, UCD, USNM); Cauna, XII-1945, A. Maller (AMNH); Pinhal XI-XII-1947-1948, A. Maller (AMNH); Rio Grande do Sul: no locality, Stieglmayr (VIENNA). ARGENTINA, Tucuman: Rio Los Sosa, XI-25-65, W. Weyrauch (LILLO); San Pedro de Colalao, Foerster (FRITZ).

Etymology:

The name longicorne is based on the the Latin words longus and cornu and it refers to the distinctive long antenna of this wasp.

Biology:

The Guyana specimens listed above emerged from "brittle clay cells in old Metapolybia nest under envelope" according to field notes 160 and 160A by O. W. Richards (in BMNH).

Pilosum Group  
(Figs. 6, 13-14, 292-340)

Description:

Frons not swollen; eye asetose; male antenna simple, flagellum without tyli or other modifications; lower half of female clypeus with long, somewhat decumbent setae that project over clypeal margin forming a "brush" (fig. 6); female clypeal lobe projecting, apex rounded to acutely triangular, often double-edged at apex (figs. 298, 323, 333); male clypeus with truncate or angular median lobe that has rounded tooth (figs. 300, 334); labrum usually with V or U-shaped emargination; mandible with posterior notch (fig. 6), female mandible with mesal tooth or cleft on cutting edge; occipital carina incomplete ventrad, ending on or near hypostomal carina; anterior edge of pronotum with polished, free lamella that extends laterad to level of pronotal lobe (figs. 294-295), no pit behind lamella; scutal flange broad, somewhat reflexed; tegula impunctate on outer half, punctate adjacent to scutum; propodeum usually with foveolate ridge or linear series of foveae laterally that defines upper limit of side (except in sphaerophallus and some pilosum); propleuron punctate, disk not largely polished; episternal sulcus sometimes evanescent ventrad as it curves toward anterior border of pleuron; metapleural flange broad, as wide as hindocellus or broader (fig. 302); forewing media diverging from M+Cu after crossvein cu-a; marginal cell acuminate distally; three submarginal cells present, III strongly narrowed toward marginal cell, its veinlets often joining there or even forming petiole; first recurrent vein ending on submarginal cell I or II, second ending



submarginal II; hamuli of hindwing divided into two groups; dorsum of hindcoxa usually delimited by inner and outer carinae (outer carina rarely absent), inner carina usually lamelliform in part; tarsomeres with plantulae; male foretrochanter with (figs. 292–293) or without spine; anterior claw of male foreleg (and sometimes midleg) distorted, usually broadly lamelliform apically (fig. 296–297); gaster without yellow tergal bands; tergum I sometimes double-edged (gnythos, sphaerophallus); male tergum VII often laterally compressed at apex forming rounded longitudinal ridge; male sternum VII sometimes with oval or round asetose depression, VIII rounded or angulate apically (figs. 303–306); genitalia robust, gonostyle represented mostly by large, broad plate, usually with short, apical setose extension (figs. 307, 311, 315, 319, 329), volsellar lobes small or scarcely defined (figs. 308, 312, 317, 330), penis valves separating distad (dorsal view) forming a broad aedeagus.

Included species:

Pison aureofaciale, gnythos, oaxaca, pilosum, sphaerophallus and vincenti.

Discussion:

The most obvious synapomorphies defining the pilosum group are: the polished, free lamella that extends around the anterior edge of the pronotum; the broad metapleural flange; and the distortion of the anterior claw of the male foreleg. The last feature is an autapomorphy, at least among New World Pison. The apical setose lobe seen on the gonostyle in other groups of New World Pison is greatly reduced in most species of the pilosum group and the gonostyle is represented mostly by a large, broad plate. I regard these and the asetose depression on male sternum VII found in three species as specializations. Other apomorphic trends in the pilosum group are: labrum usually with U-shaped median notch, the tendency for the episternal sulcus to evanesce as it curves forward ventrally, the presence of a spine on the male foretrochanter of some species, the double-edged tergum I in two species, and the laterally compressed male tergum VII of some species.

The six species of the group segregate into several lineages. The largest of these is the pilosum species complex (aureofaciale, pilosum, vincenti) in which females are nearly impossible to distinguish with certainty without associated males. These three species have one synapomorphy: male foretrochanter with spine distally. Pison oaxaca is linked to the pilosum complex via the following synapomorphies: tergum I strongly humped and the joint between it and tergum II strongly constricted when viewed in lateral profile (fig. 301), male tergum VII laterally compressed, and male sternum VII with depression.

Pison gnythos and sphaerophallus share a double-edged tergum I, a synapomorphy, but the latter species has a spine on the male foretrochanter at the middle, an autapomorphy. The gonostyli of sphaerophallus are completely fused, forming a globose genital capsule, another obvious autapomorphy. In sphaerophallus the volsellar lobes are long and finger-like and the gonostyle has a long, slender, setose, arcuate appendage apically. If the absence of a median longitudinal carina on the propodeal dorsum and absence of a line of foveae at the top of the propodeal side are loss features (i.e., reversals), then these states are additional apomorphies of sphaerophallus. The large, shiny facial "dimple" of gnythos (fig. 323) which probably has a glandular function, is an autapomorphy that isolates it from sphaerophallus. The genitalia of gnythos are more like those of the pilosum complex.

Pison pilosum Smith

(Figs. 13–14, 292, 294–296, 298–303, 307–310)

Pison pilosus Smith, 1873:295. Holotype female: Ega (= Tefé, Brasil)(BMNH).

Description, male (14 specimens):

Body black, tarsomeres II–IV brown (Mexico) or I–IV light brown or yellowish



(Panama, Colombia, Trinidad, Guyana, Suriname). Following often brownish or yellow: apex of hindtibia beneath, base of tergum VII and sterna VI-VII entirely. Flagellomeres V-XI with brown spots beneath (Panama). Appressed facial setae pale golden, dense, obscuring sculpture except on disk of frons; gena with similar vestiture. Terga I-II and sometimes III with apical silver fasciae that are broadly interrupted at midline.

Clypeal lobe with median tooth (fig. 300); labrum with U-shaped notch. Frons dull, shallowly, densely punctate, punctures smaller than those on scutum, interspaces granular; middle of frons with narrow, polished spot on midline. UID 0.57-0.62X LID. OOD 0.41-0.52X HOD. Flagellomere I length about 3X apical width, II slightly less than 3X apical width; III-X progressively shorter, outer articles only slightly longer than wide.

Thorax shiny. Scutum densely punctate, punctures averaging less than a diameter apart; scutellum similarly punctured, though punctures slightly smaller, sparser; metanotum impunctate. Propodeal dorsum with median, longitudinal carina that fades posterad, carina in depression, surface of dorsum smooth, punctate, punctures separated by one to three diameters; punctation of dorsum extending onto hindface which has a shiny, vertical, median impression and several cross-ridges just above petiole socket; propodeal side smooth, punctate, punctures sparser ventrad, side delimited dorsally by foveolate ridge. Mesopleuron smooth, densely punctate, punctures beneath scrobe somewhat larger than those of scutum, punctures separated by less than diameter above scrobe and in front of episternal sulcus, elsewhere up to 2 or 3 diameters apart; metapleuron with sparse to dense, fine, pinprick punctation. Precoxal lobes delimited at base by deep foveolate sulcus. Forewing venation variable, first recurrent vein ending on submarginal cell I or II or interstitial, these three patterns of about equal occurrence; veinlets of submarginal cell III joining at marginal cell or nearly so. Foretrochanter with sharp, posterior spine at distal third (fig. 292). Anterior claw of foreleg distorted, with broad lamella apically (fig. 296), same claw of midleg simple.

Tergum I in lateral profile strongly humped posterad, joint between I & II constricted (similar to fig. 301); terga II-III each with pair of slightly arcuate, transverse swellings just before apical margin; tergum VII laterally compressed at apex forming rounded longitudinal ridge. Sternum VII flat, without basomedian depression (fig. 303), sternum VIII as in fig. 303. Genitalia as in figs. 307-310; gonostyle in lateral profile with short, setose apical lobe (fig. 307), which, in ventral view (figs. 308-309), is merely the lateral edge of setose concavity, free (distal) edge of concavity with small, median process (fig. 309); volsellar lobe small, delimiting inner border of gonostylar concavity in ventral view (fig. 308).

Length: 6-7 mm.

#### Female (65 specimens):

Similar to male except: legs, antenna, and terminal gastral segments black (apical margins of terga sometimes pale); appressed facial and thoracic setae sometimes silvery, terga III-IV often with complete apical fasciae. Clypeus with obtusely triangular or rounded median lobe that is double-edged at apex and often somewhat translucent (figs. 298-299). UID 0.46-0.55X LID. OOD 0.29-0.48X HOD. Flagellomere I length about 4X apical width or slightly less, II about 3X apical width or slightly less, outer articles progressively shorter, X about 1.5X apical width. Thoracic punctation sometimes more uniformly dense than in male, sometimes most punctures nearly contiguous. Propodeal hindface often transversely punctatorugose nearly to top; foveolate ridge of propodeal side often reduced to linear series of large pits (fig. 302), or even absent. Both recurrent veins usually ending on submarginal cell II, occasionally recurrent I interstitial between submarginals I and II, or rarely I ends on submarginal cell I. Swellings of terga II-III sometimes weak, especially on III. Length: 6-8.5 mm.



Discussion:

Pison pilosum is the most commonly collected species of the pilosum group. Females of pilosum, aureofaciale and vincenti are extremely similar and I have been unable to find morphological differences between them. Males of these three can be separated by differences in sterna VII and VIII, and genitalia.

The only definite male/female associations of pilosum before me were reared from nests taken at St. Augustine, Trinidad (BMNH), the Canal Zone (USNM), and Paramaribo, Suriname (LEIDEN). I have been unable to find any differences between these females and the single female of vincenti, so it is quite possible that some of my females of "pilosum" are vincenti. Sternum VII is flat basally in males of pilosum (fig. 303), sternum VIII is moderately narrow toward the apex (fig. 303), and the genitalia (figs. 307–310) are distinctive. Females that I have associated with these males have completely black antennae, as does the single female of vincenti known to me (pinned with its presumed male on one pin). Females of aureofaciale have pale areas ventrally on flagellomeres I and II and sometimes III, and the appressed facial setae are more golden than in pilosum and vincenti.

Males of pilosum also differ from those of aureofaciale and vincenti in having an unmodified anterior claw on the midleg. This claw is distorted and apically laminate in the latter two species.

Unfortunately Smith's type of pilosum is a female, and, although I have examined it, I cannot be certain that it is conspecific with what I am interpreting as that species.

Range:

I have seen males of pilosum from southern Mexico (Chiapas), Costa Rica, Panama, Colombia, Trinidad, Guyana and Suriname. Females that I have interpreted as this species have been taken within that area, but also as far north as Jalisco, Mexico, and as far south as Bolivia and Santa Catarina in Brasil.

Material examined (79 specimens):

MEXICO, Nuevo Leon: Sierra de Picachos, 7 mi. s Cerralvo, ♀, (USNM); Jalisco: Chamela, ♀ (USU); Chiapas: Escuintla, ♂ (USNM). COSTA RICA, Guanacaste: Rio Corbici nr. Canas, ♀ (UCD); Bebedero, ♀ (MCZ); Santa Rosa N. Park, ♂, ♀ (BMNH); Heredia: F. La Selva, 3 km s Pto. Viejo, ♂ (USNM). PANAMA, Canal Zone: Barro Colorado I., ♀ (UCD); ex Canal Zone, intercepted at Brownsville, Texas in Cattleya gigas, ♂, ♀ (USNM). COLOMBIA, Antioquia: Fredonia, ♂ (USNM), Valle Medellin, ♂ (USNM); Meta: Cord. Macarena, ♀ (BMNH); Valle: Mun. Candelaria, Finca San Luis, ♀ (CSDA, FSDA); Magdalena: N. Sierra Nevada de S., Marta, Rio Buritaca, ♀ (BMNH); Amazonas: Leticia, ♀ (BMNH, CNC); Vaupés: Mitu, ♀ (BMNH); Caquetá: Yuruyaco, 73 km sw Florencia, ♀ (BMNH); Putumayo: Mocoa, ♀ (BMNH). VENEZUELA, Monagas: Rio Marichal Largo (puente), ♀ (UCM). TRINIDAD: St. Augustine, ♂, ♀ (BMNH); Curepe, ♀ (PMA, CNC). GUYANA: Blairmont, ♂, ♀ (BMNH); Georgetown, ♀ (BMNH), Kaieteur, High Forest, ♀ (BMNH). SURINAME: Paramaribo, ♂, ♀ (LEIDEN, BERLIN). BRASIL, Pará: Belém, ♀ (CSDA, BPBM, VIENNA, USNM); Santarem, ♀ (CMP); Tabatinga, ♀ (VIENNA); Guanabara: Rio de Janeiro, ♀ (USNM); Sao Paulo: Teodoro Sampaio, ♀ (FRITZ); Santa Catarina: Nova Teutonia, ♀ (UCD). ECUADOR, Napo: Limoncocha, ♀ (CNC, FSDA, USNM); Tena, ♀ (BMNH, BPBM, PMA). PERU, Loreto: Pucallpa, ♀ (BMNH); Huanuco: Tingo Maria, ♀ (CAS); Pasco: Puerto Bermudez, ♀ (CU). BOLIVIA, Beni: Río Mamore 10 km e San Antonio, ♀ (AMNH); Santa Cruz: Puerto Grether, ♀ (COOPER).

Biology:

Some specimens bear labels indicating that they were reared from mud cells. F. X. Williams noted that one female that he reared in Guyana "hatched ... from Pseudagenia-like cell mass [on] underside of leaf".



Pison aureofaciale Strand  
(Figs. 304, 311-314)

Pison aureofaciale Strand, 1910:174. Lectotype male: Asunción, Paraguay, present designation. (BERLIN).

Description, male (6 specimens):

As described for pilosum except: pale markings variably developed on antenna: scape and pedicel varying from light brown to black, flagellomeres I-IV, or V, or VII light brown or yellowish; apical margins of terga and sterna II-VII pale. Appressed facial setae pale to bright golden, dense, obscuring surface of frons; tergal fasciae pale golden, present on I-VI, that of I interrupted at middle. UID 0.58-0.65X LID. OOD 0.47-0.63X HOD. Flagellomere I length slightly more than 3X apical width, II 3X apical width. First recurrent vein ending on submarginal cell II or interstitial between I and II; third submarginal cell sometimes narrowly petiolate at marginal cell. Anterior claw of midleg distorted, apically laminate. Sternum VII with circular depression at base (fig. 304), VIII narrowing to fairly sharp apex (fig. 304). Genitalia as in figs. 311-314; gonostyle with short, setose apical lobe whose apex is bent ventrad hooklike (ventral view, figs. 312-313); volsellar lobes discrete.

Length 5.5-7 mm.

Female (7 specimens):

Similar to male except: Scape and pedicel black, flagellomeres I-II, and sometimes III, pale, at least beneath at apex; legs black; clypeal lobe obtusely triangular, narrowly double-edged at apex, often pale, translucent; UID 0.52-0.55X LID; OOD 0.38-0.51X HOD; flagellomere I length 3.5-4X apical width, II 3X apical width or slightly less; first recurrent vein occasionally ending on submarginal cell I; tergal swellings sometimes weak, especially on III; length 7-7.5 mm.

Discussion:

This species is so similar to pilosum that I first thought aureofaciale was nothing more than a geographic color form of it. But the male genitalia (figs. 311-314) and sterna VII-VIII (fig. 304) are quite different. The pale areas on the antenna aid in the identification of aureofaciale, but the variation observed in the few specimens available suggest that this feature is not likely to hold up over the entire range of the species, especially in the female. I cannot find any morphological differences between females of aureofaciale and pilosum.

I have examined Strand's 3 male and 3 female syntypes of aureofaciale and labeled one male as lectotype.

Range:

Paraguay and Brasil. Brazilian material is represented by a male and female labeled simply "Bahia". There are several sites with this name in Brasil, but I am assuming that the one in the province of Santa Catarina is the most likely for these specimens.

Material examined (13 specimens):

PARAGUAY: Asunción, ♂, ♀ (BERLIN); San Bernardino, ♂, ♀ (BERLIN); San Pedro Cororo, Río Ypane, ♂ (CSDA); Col. Piarerata, ♀ (FRITZ). BRASIL: Bahía, ♂, ♀ (PARIS).

Pison vincenti Menke, n. sp.  
(Figs. 305, 315-318)

Description, holotype male:

Same as pilosum except: Body entirely black except tergal margins II-IV pale; appressed facial setae silver, dense except on disk of frons; UID 0.54X LID; OOD



0.52X HOD; flagellomere I length slightly more than 3X apical width, II 3X apical width; punctures of propodeal dorsum separated by puncture diameter or less on average; mesopleural punctures beneath scrobe about same size as those on scutum and separated by puncture diameter or less; forewing membrane weakly stained in cellular area, first recurrent vein ending on first submarginal cell; veinlets of submarginal cell III meeting on marginal cell; anterior claw of midleg distorted, laminate apically; terga II-III without arcuate swellings near apical margin; sternum VII with deep, elongate depression (fig. 305), VIII broadly rounded apically (fig. 305); male genitalia as in figs. 315-318; gonostyle with short, setose apical lobe whose apex is truncate in ventral view (fig. 317), and bent ventrad as digiform process (figs. 315-316); volsellar lobes distinct.

Length 7 mm.

Male variation (1 specimen):

Foretarsomeres III-IV brownish; facial setae and tergal fasciae weakly golden; UID 0.58X LID; forewing membrane unstained in cellular area; terga II-III each with pair of arcuate, transverse swellings just before apical margin.

Female (1 specimen):

Like holotype except: UID 0.5X LID; OOD 0.43X HOD; flagellomere I length 4X apical width, II slightly less than 4X apical width; clypeus with obtusely triangular median lobe that is double-edged at apex and somewhat translucent; forewing membrane not stained in cellular area, first recurrent vein ending on second submarginal cell; terga II-III each with pair of arcuate, transverse swellings just before apical margin; length 8.5 mm.

Discussion:

The male of vincenti is easily recognized by the distinctive elongate depression of sternum VII (fig. 305) and the male genitalia (figs. 315-318). The female, however, is inseparable from pilosum. The single female known is pinned together with the paratype male and presumably they were caught in copula. The male genitalia of vincenti are similar to aureofaciale but the apex of the gonostyle is truncate in ventral view (fig. 317). The gonostyle is more rounded apically in aureofaciale (fig. 313), and the form of the depression on sternum VII and shape of sternum VIII are different in the two species (compare figs. 304-305).

Range:

Known only from Ecuador and Guyana.

Types:

Holotype male: ECUADOR, Napo: Tena, V-24-1977, D. Vincent (USNM).

Paratypes (1 male, 1 female): GUYANA: Kartabo, Bartica District, IX-6-20 (AMNH).

Etymology:

I take pleasure in naming this wasp after David Vincent, collector of the holotype.

Pison oaxaca Menke, n. sp.

(Figs. 306, 319-322)

Description, holotype male:

Black; tarsomeres II-IV pale; face with appressed silver setae that obscure sculpture except on disk of frons; terga without obvious fasciae.

Labrum quadrangular but with deep U-shaped emargination; distal half of stipes (maxilla) without depression; clypeus with obtusely angular median lobe; frons dull,



closely punctate, interspaces granulate, punctures smaller than those on scutum; UID 0.58X LID; OOD 0.50X HOD; flagellomere I length 3X apical width, II nearly 3X apical width; distal flagellomeres slightly longer than wide.

Thorax shiny; scutum densely punctate, punctures separated by less than puncture diameter; scutellum gibbous, punctured similar to scutum but punctures slightly smaller; metanotum with fine setigerous punctures; propodeal dorsum with median longitudinal carina that fades posterad, rest of surface punctate, punctures similar to those of scutum but sparser, one to two diameters apart, propodeal hindface with similar punctation and few transverse ridges near petiole socket, propodeal side more sparsely punctate than dorsum, side delimited dorsad by foveolate ridge. Mesopleural punctation as dense as on scutum, but slightly coarser; metapleuron densely punctate, but punctures much finer than those of mesopleuron; precoxal lobes delimited at base by deep, foveolate sulcus. First recurrent vein interstitial between submarginal cells I-II; veinlets of submarginal cell III almost meeting on marginal cell. Foretrochanter without spine. Anterior claw of foreleg distorted, laminate apically, same claw of midleg unmodified. Hindcoxa with lamelliform outer dorsal carina.

Tergum I in lateral profile strongly humped, joint between I-II constricted; terga II-III with weak paired swellings near apical margins. Tergum VII compressed laterally at apex forming rounded longitudinal ridge. Sternum VII with circular depression (fig. 306), VIII broadly triangular at apex (fig. 306). Genitalia as in figs. 319-322, gonostyle with short, setose apical lobe whose inner margin bears a short spine-like process (figs. 320-321).

Length 6.5 mm.

Female:

Unknown.

Discussion:

Pison oaxaca is only known from the holotype. The species shares most of the characters of the pilosum species complex, but the foretrochanter of oaxaca lacks a spine. This, combined with the circular depression of sternum VII, the shape of sternum VIII and the appearance of the genitalia, makes oaxaca easily recognizable. The obtusely angular form of the median lobe of the clypeus also seems diagnostic. In the pilosum species complex the median lobe of the male is basically quadrate with a prominent point in the middle (fig. 300).

Range:

Known only from southern Mexico.

Type:

Holotype male: MEXICO, Oaxaca: Temascal, X-17-1963, K. H. Janzen (USNM).

Etymology:

The name oaxaca, a noun in apposition, is the Mexican state in which the species was collected.

Pison gnythos Menke, n. sp.  
(Figs. 6, 323-332)

Description, holotype male:

Black; face with appressed silver setae that obscure sculpture except on disk of frons; terga without obvious fasciae.

Labrum quadrangular but with deep U-shaped emargination; distal half of stipes (maxilla) with large, deep, depression; clypeus similar to that of pilosum (fig. 300); frons dull, granulate, with polished dimple on midline above antennal sockets that is



almost as large as midocellus; UID 0.39X LID; OOD 0.20X HOD; flagellomere I length 4X apical width, II 3X apical width; (left antenna missing, right one missing flagellomeres III–XI).

Thorax shiny; scutum densely punctate, punctures separated by less than puncture diameter; scutellum gibbous, punctation similar to scutum but somewhat sparser and finer; metanotum without obvious punctation. Propodeal dorsum with median, longitudinal carina in depression, rest of dorsum with fine, setigerous punctation that becomes denser, coarser laterad; propodeal hindface punctate above, with several cross-ridges below; propodeal side punctate, punctures becoming progressively finer and denser ventrad, side delimited dorsally by row of foveae. Mesopleural punctation above scrobe and before episternal sulcus dense, but finer than that of scutum, rest of pleuron with larger, sparser punctures (1–3 diameters apart); metapleuron with dense, pinprick punctures above, impunctate and smooth below. Precoxal lobes delimited by foveolate sulcus. First recurrent vein ending on submarginal cell I; veinlets of submarginal cell III separated on marginal cell. Foretrochanter without spine. Anterior claw of foreleg distorted, lamelliform. Hindcoxa without outer dorsal carina.

No strong constriction between terga I–II of gaster; tergum I with subapical beadlike rim. Tergum II with pair of arcuately transverse swellings near apical margin, III with similar but weak swellings. Tergum VII not laterally compressed. Sternum VII flat, VIII bluntly rounded apically (fig. 328). Genitalia as in figs. 329–332; gonostyle with short, setose apical lobe whose inner margin bears a hooklike lobe (figs. 330–331); volsellar lobes weakly defined (fig. 330).

Length 7 mm.

#### Female (15 specimens):

Similar to male except: clypeus with dense, appressed silver hair only laterally; tergum I with silver fascia laterally, II–IV with tarnished silver fasciae laterally; forewing membrane sometimes lightly stained; labrum with shallow median emargination, or edge entire; clypeus with rounded median lobe (fig. 324); frons with median polished dimple that usually contains small pit (fig. 323), dimple variable in size, somewhat smaller than to larger than midocellus, and delimited on lower edge by tubercular swelling that is usually surmounted by short carina (fig. 325); UID 0.35–0.40X LID; OOD 0.20X HOD or less; flagellomere I length 4X apical width or more, II 3X apical width or more, flagellomeres VII–IX about 2X apical width; thorax somewhat more densely punctate than male, especially on propodeum and mesopleuron; carina of propodeal dorsum often with short cross-carinae; first recurrent vein ending on submarginal cell II or interstitial between I–II; veinlets of submarginal cell III joining at marginal cell, sometimes cell narrowly petiolate there; hindcoxa with low, outer carina on dorsum; length 6.5–8 mm.

#### Discussion:

Females of gnythos are usually easily identified by the large polished dimple-like facial depression (fig. 323), and the form of the clypeal lobe (fig. 324). The facial dimple is present in males but it is comparatively smaller. The male has a simple foretrochanter and the genitalia are diagnostic (figs. 329–332). The upper interocular distance is narrower than in other species of the pilosum group (UID 40% of LID or less in gnythos), and the hindocellus is very narrowly separated from the eye (OOD = 0.20X HOD or less). In both sexes tergum I has a bead-like rim just before the free margin (figs. 326–327). This character state is nearly identical to the double-edged tergum I in sphaerophallus. The apical depression on the stipes, the weakly emarginate female labrum, and absence of an outer carina on the hindcoxa of the male are other distinctive characters of gnythos.

The median carina and the lateral foveolate ridge of the propodeum suggest a close relationship with the pilosum complex, but the absence of a strong constriction between terga I–II, the non-compressed tergum VII of the male, and simple male foretrochanter isolate gnythos.



Range:

Known from Colombia, Ecuador, Trinidad and Guyana.

Types:

Holotype male (pinned with female): GUYANA, Kartabo, IX-4-1922 (AMNH).

Paratypes (15 females): COLOMBIA, Putumayo: Mocoa, III-26/IV-6-76, I-1/10-77, M. Cooper (BMNH); Villa Garzon, 8 mi. s Mocoa, VII-22-78, VIII-31, IX-29, X-7/13-84, M. Cooper (BMNH, COOPER); Caqueta: Yuruyaco, 73 km sw Florencia, II-12-79, M. Cooper (BMNH). ECUADOR, Morona-Santiago: Cord. de Cutucu, 6 km e Macas, 1100 m, V-14-81, M. Cooper (COOPER); Napo: Muyuna, 500 m, 5 km w Tena, VIII-23-81, M. Cooper (COOPER). TRINIDAD: IV-30/V-13-33, D. Vesey-Fitzgerald (BMNH). GUYANA: Kartabo, IX-4-22 (AMNH).

Etymology:

The Greek noun gnythos means pit or hollow, a reference to the distinctive large dimple on the female frons.

Pison sphaerophallus Menke, n. sp.  
(Figs. 293, 297, 333-340)

Description, holotype male:

Black, hindtarsomeres III-IV brownish beneath. Appressed facial setae silver, dense only laterally on clypeus and lower frons. Terga II-III with tarnished silver fasciae laterally.

Labrum quadrangular but with deep, median V-shaped notch. Distal half of stipes flat. Clypeus as in fig. 334; frons dull, surface minutely granulate, impunctate, with small polished area on midline above antennal sockets; UID 0.58X LID; vertex with transverse impression just behind ocelli; OOD 0.50X HOD; flagellomere I length nearly 4X apical width, II nearly 3X apical width, VI-IX about as long as wide.

Thorax shiny; scutum densely punctate, punctures separated by less than puncture diameter, nearly contiguous; scutellum gibbous, more finely, sparsely punctate than scutum, punctures one to four diameters apart, especially posterad; metanotum with scattered pinprick punctures. Propodeal dorsum with sparse setigerous micropunctures separated by 3 or 4 diameters, surface smooth, without median carina; rest of propodeum similarly punctate but punctures larger on hindface and upper part of side; propodeum without foveolate ridge at top of side (similar to fig. 337). Mesopleural punctation above scrobe and before episternal sulcus dense, similar to that of scutum, but punctures sparser and larger over rest of pleuron, separated by up to 3 diameters, interspaces smooth; metapleuron finely, sparsely punctate; precoxal lobes delimited at base by transverse carina and foveolate sulcus. First recurrent vein of forewing ending near apex of first submarginal cell; veinlets of third submarginal cell joining at marginal cell. Foretrochanter with sharp spine beneath near middle (fig. 293). Anterior claw of foreleg distorted but apical lamella narrow, claw with angular basal tooth (fig. 297), same claw of midleg unmodified.

No strong constriction between terga I-II of gaster, tergum I narrowly double-edged apically, terga II-III each with pair of arcuately transverse swellings near apical margin; tergum VII not laterally compressed; sternum VII with vague, basomedian depression, VIII broadly, bluntly rounded at apex. Genitalia as in figs. 338-340, gonostyli fused forming a spherical box upon which the volsellar lobes (fig. 339) and elongate gonostyli (fig. 338) appear as slender appendages.

Length: 6.5 mm.

Variation in males (7 specimens):

Tarsomeres II-IV sometimes almost entirely pale; UID 0.58-0.63X LID; OOD 0.44-0.71X HOD; flagellomere I length 3-3.5X apical width, II sometimes only



slightly more than 2X apical width; propodeal side sometimes largely impunctate below, surface smooth, glossy; mesopleuron punctation beneath scrobe sometimes denser, punctures 1–2 diameters apart; metapleuron sometimes impunctate below; veinlets of third submarginal cell widely separated on marginal cell in one specimen.

#### Female (13 specimens):

Similar to male except: body completely black, forewing membrane sometimes lightly stained; clypeus with acute triangular median lobe (fig. 333); UID 0.52–0.57X LID; flagellomere I length 4X apical width or slightly less, II 3X apical width or slightly less. Length 6.5–7.5 mm.

#### Discussion:

Pison sphaerophallus is the most easily identified species in the pilosum group. The absence of a median carina on the smooth propodeal dorsum (fig. 337), and absence of a lateral foveolate propodeal ridge are unique features. The double-edged free margin of tergum I (figs. 335–336), the median position of the male foretrochanter spine (fig. 293) and acutely triangular median lobe of the female clypeus (fig. 333) are additional characters of sphaerophallus. The spheroid male genital capsule is particularly unusual and immediately diagnostic (figs. 338–340). The distortion of the anterior male foreleg claw is less developed in sphaerophallus than other species of the pilosum group, but the presence of an angular tooth-like prominence at its base is distinctive (fig. 297).

#### Range:

Known from Colombia, Ecuador, Peru, Guyana, Suriname and the Amazon basin of Brasil.

#### Types:

Holotype male: COLOMBIA, Meta: La Macarena, XI-20/29-1976, M. Cooper (BMNH).

Paratypes (7 males, 13 females): COLOMBIA, Meta: La Macarena, XI-20/29-76, M. Cooper (BMNH); Putumayo: Mocoa, X-30-74 (biol. note #259), M. Cooper (BMNH), Villa Garzon, 400 m, IX-6, X-6/13-84, M. Cooper (COOPER). ECUADOR, Napo: Muyuna, 5 km w Tena, XI-30-78, M. Cooper (BMNH); Pastaza: Río Pastaza road between Puyo and Macas, 900 m, V-27-87, M. Cooper (COOPER). PERU, Huanuco: Tingo Maria, X-5-46, Weyrauch (USNM), Tingo Maria, X-9-54, Schlinger & Ross (CAS). GUYANA: Mazaruni, nest 53A, VIII-19-37, Richards & Smart (BMNH). SURINAME: 1963, D. Geyskes (LEIDEN). BRASIL, Pará: Belém, III-10-07, A. Ducke (VIENNA); prov. unknown: Rio Jaravi, Estirao do Equador, X-1979, Alvarenga (FRITZ).

#### Etymology:

The name sphaerophallus, a noun in apposition, is formed from the Greek sphaero- meaning ball, and the Greek word phallos meaning penis. The name refers to the distinctive male genitalia.

#### Biology:

Martin Cooper found a mud nest of sphaerophallus on the under side of an epiphyte leaf in primary forest (biological note #259, BMNH). The nest was oval and flattened and contained about 10 cells arranged in two parallel rows. Four adults were reared from the nest. The cocoon walls were made up of micro-sized sand grains presumably held together with silk.

The Guyana material listed above came from a nest, but I have not had access to the field notes (nest #53A, BMNH).



## APPENDIX

Pison laeve Smith

Pison laevis Smith, 1856:317. Holotype male: "Georgia" (BMNH).

Pison laeve, Krombein, 1979:1641. Doubts North American origin, suggests New Georgia in Solomon Islands.

Discussion:

I have examined Smith's type of laeve, and it is unlike any New World species known to me. The provenance of the type certainly was not the state of Georgia, and Krombein (1979) suggested that it may have originated on one of the islands of Melanesia or Micronesia. The type of laeve does resemble some of the smooth, shiny, sparsely punctate species from the western Pacific Ocean that lack a dorsolateral propodeal ridge such as nigellum Krombein and insulare Smith, but the very broad scutal flange of laeve differentiates it from them. Colin Vardy (pers. comm.) says that he has compared the type of laeve with "all our named species" and it is not conspecific with any of them.

Some of the characteristics of laeve are: black, wings moderately infumate, body with scattered erect pale setae, silver setae restricted to lower gena and lower face; occipital carina incomplete, ending ventrad; labrum quadrangular but with mesal emargination; clypeal lobe triangular (similar to male of insulare but not as prominent as in that species); lower frons and clypeus with appressed silver setae; frons dull, granular in appearance, impunctate; UID 0.64X LID; OOD = 0.22X HOD; flagellomeres elongate, flagellomere I length 3X apical width; thorax smooth, shiny, sparsely punctate, punctures coarsest on mesopleuron; pronotum with simple median pit just behind anterior margin; upturned flange at lateral margin of scutum very broad, equal to diameter of hindocellus; propodeum smooth, shiny, sparsely punctate, dorsum with median longitudinal impression but no carina, dorsum without ridge laterally; dorsum of hindcoxa with low inner carina but no outer carina; terga shiny, sparsely, shallowly punctate, without fasciae; tergum VII truncate; sternum VIII emarginate, similar to insulare.

New species of Pison from New Guinea

Two new species are described here because they share two apomorphic features that occur rarely in the genus. The eye facets are considerably enlarged toward the inner orbits (figs. 341-344), and gastral segment I is claviform (figs. 347-350). Enlarged eye facets occur in the Australasian species ignavum and ruficorne but the enlargement in these species is not nearly as striking as in the two described below. A clavate first abdominal segment is known elsewhere in the genus (difficile, icarioides, obliteratum, lobiferum, for example) but the degree of petiolation is most highly developed in the two new species.

In one of the two new species, the antennal sockets are separated from the frontoclypeal suture, a condition typical of the genus Trypoxylon and rare or unknown in other species of Pison.

Although the two new species share several apomorphies (the two above plus a transversely elongate anterodorsal pronotal pit, a laterodorsal propodeal carina, and an emarginate labrum), it is not clear if they are sister species. The wing venation differs considerably between them (compare figures 345-346), as does the makeup of the clypeus and form of the eye notch (figs. 341, 343). On the other hand, both species have a large fovea laterobasally on sternum II, a feature that may be unique to them, and possibly an apomorphy.

Both species were collected in a malaise trap at the same location in northwestern New Guinea.



Pison pistillum Menke, n. sp.  
(Figs. 341–342, 345, 347, 349)

Description, holotype female:

Black except following yellow brown: scape, lower side of pedicel, lower two-thirds of clypeus, basal half of mandible, palpi, tegula, hindmargin of pronotal lobe, legs except hindtarsomeres III–V and all arolia which are black. Wings clear, veins black. Clypeus with dense, appressed silver setae, this vestiture continued dorsad along inner orbit to eye notch and narrowly beyond to level of midocellus; gena with dense, appressed silver setae; thoracic vestiture short, silver, sparse on scutum, scutellum and propodeal dorsum. Gaster largely bare but with sparse, appressed silver setae on tergum II laterobasally and apicolaterally on tergum III.

Disk of frons weakly shiny, alutaceous, vaguely, shallowly punctate. Eye notches acute (fig. 341), distance between them 0.84X eye length; eye facets increasingly larger toward inner orbit, those at level of antennal sockets largest, 2X as large as smallest facets (fig. 342). Antennal socket separated from frontoclypeal suture by 0.40X midocellus diameter; antennal flagellum elongate, flagellomere I length 4.5X apical width, VII length 2.3X apical width. UID 0.96X LID (just below antennal sockets); OOD 0.18X HOD. Clypeal disk angularly swollen in lateral profile, lower two-thirds of swelling flat; clypeal lobe present, margin thin, trilobate (fig. 342). Labrum semicircularly emarginate apically. Mandible with subbasal tooth on cutting edge (fig. 342), entire posterobasally. Occipital carina incomplete ventrally.

Pronotum with long, deep, transverse depression anterodorsally (length nearly equal to UID), depression margined posteriorly by sharp carina and anteriorly by overhanging lamelliform carina; collar non-carinate, rounded laterally. Scutum weakly shiny, densely micropunctate, punctures about a diameter apart. Tegula impunctate on outer third. Scutellum shiny, densely micropunctate, the punctures smaller than those of scutum and 1–4 diameters apart. Propodeal dorsum smooth, shiny, micropunctate similar to scutellum, with median, longitudinal, linear impression that contains weak carina at base; propodeal hindface more coarsely, densely but shallowly punctate than dorsum, with deep, longitudinal depression; propodeal side delimited dorsad by sharp, arcuate carina that extends from petiole socket nearly to spiracle, side shiny, impunctate near metapleural sulcus, but extremely finely micropunctate elsewhere. Propleuron shiny, largely impunctate. Episternal sulcus disappearing ventrad as it begins to curve anterad. Mesopleuron shiny, densely micropunctate.

Forewing with three submarginal cells, third conspicuously narrowed toward marginal cell; media diverging from M+Cu well before crossvein cu-a (fig. 345).

Hindcoxa with inner dorsal carina that ends before apex, outer dorsal carina absent; tarsomere IV with plantula; tarsal claw tapering gradually to apex.

Gaster shiny, micropunctate, punctures separated by one to several diameters; segment I clavate (figs. 347, 349), tergum I depressed bandlike along free edge.

Length 10.5 mm.

Male:

Unknown.

Discussion:

Pison pistillum differs from woji in wing venation (fig. 345, media diverging before cu-a, shape of submarginal cell III); in the more elongate antennal flagellum; in the projecting, trilobate clypeal lobe (fig. 342) and flattened clypeal disk (not apparent in SEM photos); in the sharp eye notch; and the color and form of the first gastral segment (compare figs. 347–350). Pison pistillum is also a larger wasp than woji.

Distribution:

Known only from a single location in northwestern New Guinea.



Type:

Holotype female: PAPUA NEW GUINEA, Enga Prov.?: Baiyer River, II-6/25-1979, 1100 m, J. Sedlacek (AEI).

Etymology:

The name pistillum, a noun in apposition, is the Latin word for the club shaped pounder used in a mortar. Here it refers to the claviform first abdominal segment of this wasp.

Pison woji Menke, n. sp.  
(Figs. 343-344, 346, 348, 350)

Description, female:

Black except following yellow brown: scape, pedicel and flagellomeres I-II beneath; mandible except tip; palpi; tegula; hindmargin of pronotal lobe; legs except coxae, midtarsomeres II-IV, hindtarsomeres II-V, and all arolia; gastral segment I. Wings clear, veins dark brown. Clypeus with dense, appressed silver setae, this vestiture continued dorsad along inner orbit to eye notch and narrowly beyond to level of midocellus; gena with dense appressed silver setae; thoracic vestiture short, silver, sparse on scutum, scutellum and propodeal dorsum. Abdominal vestiture short, sparse, brownish.

Disk of frons weakly shiny, alutaceous, vaguely, shallowly punctate. Eye notches rounded (fig. 343), distance between them 0.97X eye length; eye facets increasingly larger toward inner orbit below notch, those at level of antennal sockets largest, about 3X as large as smallest facets (fig. 344). Antennal socket essentially contiguous with frontoclypeal suture; antennal flagellum moderately elongate, flagellum I length 2.75X apical width, VII length 1.5X apical width. UID essentially = LID (at level of sockets); OOD 0.22X HOD. Clypeal disk evenly convex; clypeal free margin broadly arcuate, without median lobe (fig. 344), edge of margin narrowly folded under at middle, edge otherwise not thickened. Labrum semicircularly emarginate apically. Mandible with weak tooth at middle of cutting edge (fig. 344), entire posterobasally. Occipital carina incomplete ventrally.

Pronotum with long, narrow, transverse depression anterodorsally (length about two-thirds of UID), depression margined posteriorly by sharp carina and anteriorly by sharp edge; collar non-carinate, rounded laterally. Scutum weakly shiny, densely, shallowly punctate, punctures less than diameter apart. Tegula impunctate on outer third. Scutellum weakly shiny, densely punctate, punctures smaller than those of scutum, about one diameter apart. Propodeal dorsum smooth, shiny, punctate, punctures finer than those of scutellum, one-half to one diameter apart; dorsum with median, longitudinal carina that ends about two-thirds distance to apex; propodeal hindface punctate similar to dorsum and with deep, longitudinal depression; propodeal side delimited dorsad by sharp, arcuate carina that extends from petiole socket nearly to spiracle (fig. 348), side shiny, finely micropunctate. Propleuron weakly shiny, obscurely micropunctate. Episternal sulcus disappearing ventrad as it begins to curve anterad. Mesopleuron shiny, obscurely micropunctate.

Forewing with three submarginal cells, third not much narrowed toward marginal cell; media diverging from M+Cu after crossvein cu-a (fig. 346).

Hindcoxa with inner dorsal carina that ends before apex, outer dorsal carina absent; tarsomere IV with plantula; tarsal claw tapering gradually to apex.

Gaster weakly shiny, micropunctate, punctures separated by 2 to 4 diameters; segment I clavate (figs. 348, 350), tergum I entirely dorsal from base to spiracles (fig. 348).

Length 6.5-8 mm.

Male:

Unknown.



Variation:  
Nothing of significance.

Discussion:  
Pison woji differs from pistillum in forewing venation (fig. 346, media diverging after cu-a, shape of submarginal cell III); the less elongate antennal flagellum; the arcuate clypeal margin (fig. 344) and evenly convex clypeal disk (fig. 343); the rounded eye notch; and the yellowish brown color and form of the first abdominal segment (fig. 348). Pison woji is a smaller species than pistillum.

Types:  
Holotype female: PAPUA NEW GUINEA, Enga Prov.?: Baiyer River, I-25/II-6-1979, 1100 m, J. Sedlacek (AEI).  
Paratypes (5 females): Same data as holotype except collected XII-26-1978 to III-9-1979 (AEI).

Etymology:  
This wasp is affectionately dedicated to Wojciech "Woj" Pulawski, sphecid expert, masterful sphecid collector, and valued friend.

Key to species of Pisonopsis

- 1. From southern South America ..... 2
- From western North America and Mexico ..... 3
- 2. Scutum and scutellum weakly shiny, uniformly densely punctate; hindwing jugal lobe small, its length about one-third length of submedial cell; female clypeus without nasiform process above free margin; female without pygidial plate; Chile and Argentina ..... areolata (Spinola)
- Disk of scutum and all of scutellum polished, both coarsely, sparsely punctate, the last almost impunctate; hindwing jugal lobe length about half that of submedial cell; female clypeus with nasiform process above free margin; female with pygidial plate margined by carinae; Argentina ..... australis Fritz
- 3. Female with pygidial plate margined by carinae; male clypeal lobe quadrangular but with rounded median tooth; interspaces between scutal and scutellar punctures polished ..... clypeata Ashmead
- Female without pygidial plate; male clypeal lobe triangular; interspaces between scutal and scutellar punctures dull to shiny ..... 4
- 4. Pronotal lobe pale or whitish posteriorly; apex of male sternum VIII emarginate resulting in pair of prongs ..... birkmanni Rohwer
- Pronotal lobe all black; male sternum VIII truncate apically ..... triangularis Ashmead

The subspecies of Pisonopsis triangularis and clypeata (i.e., californica and occidentalis, respectively) established by Williams (1954) are not recognized by Bohart (in litt.) who feels that they are simply variants within each species.



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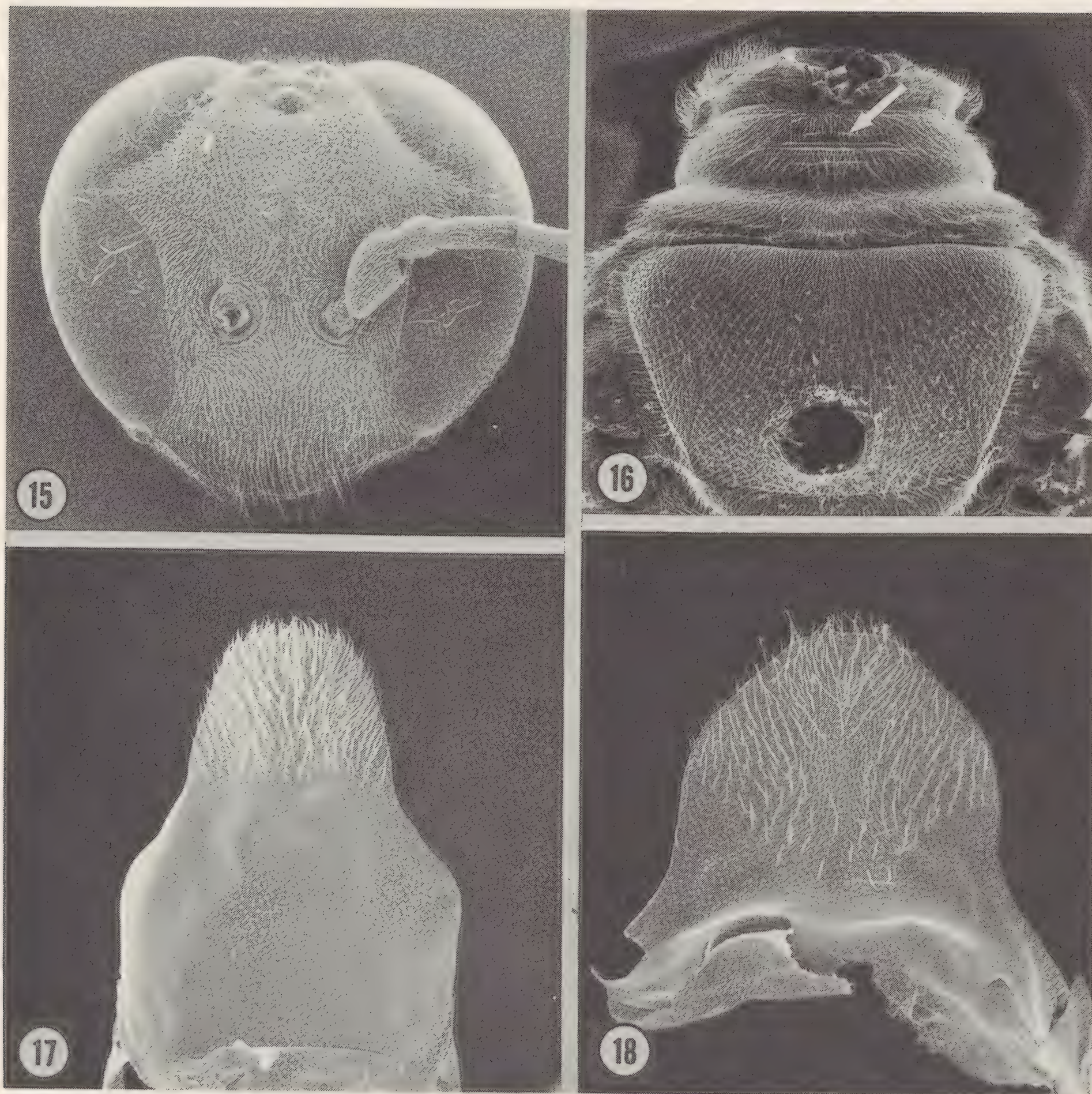


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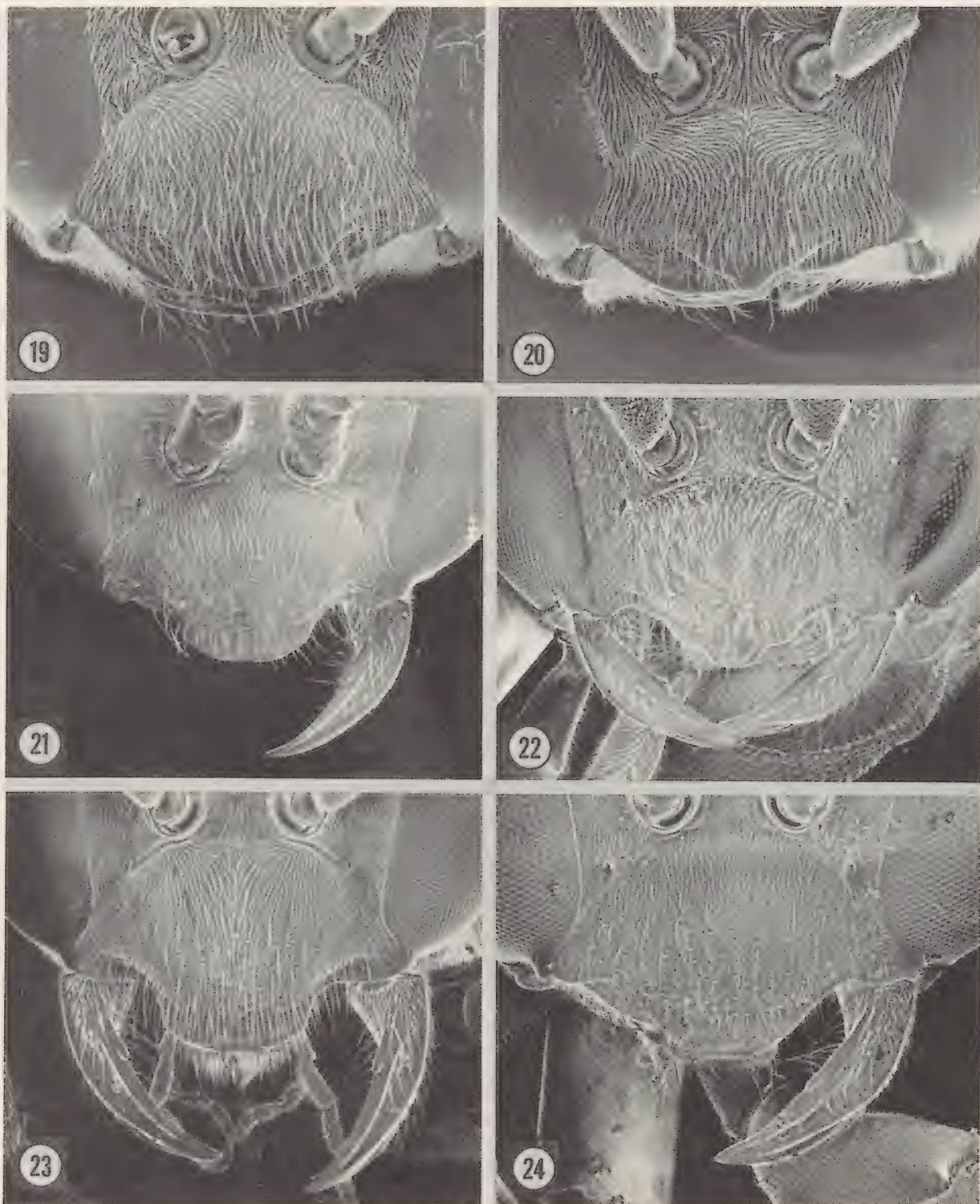
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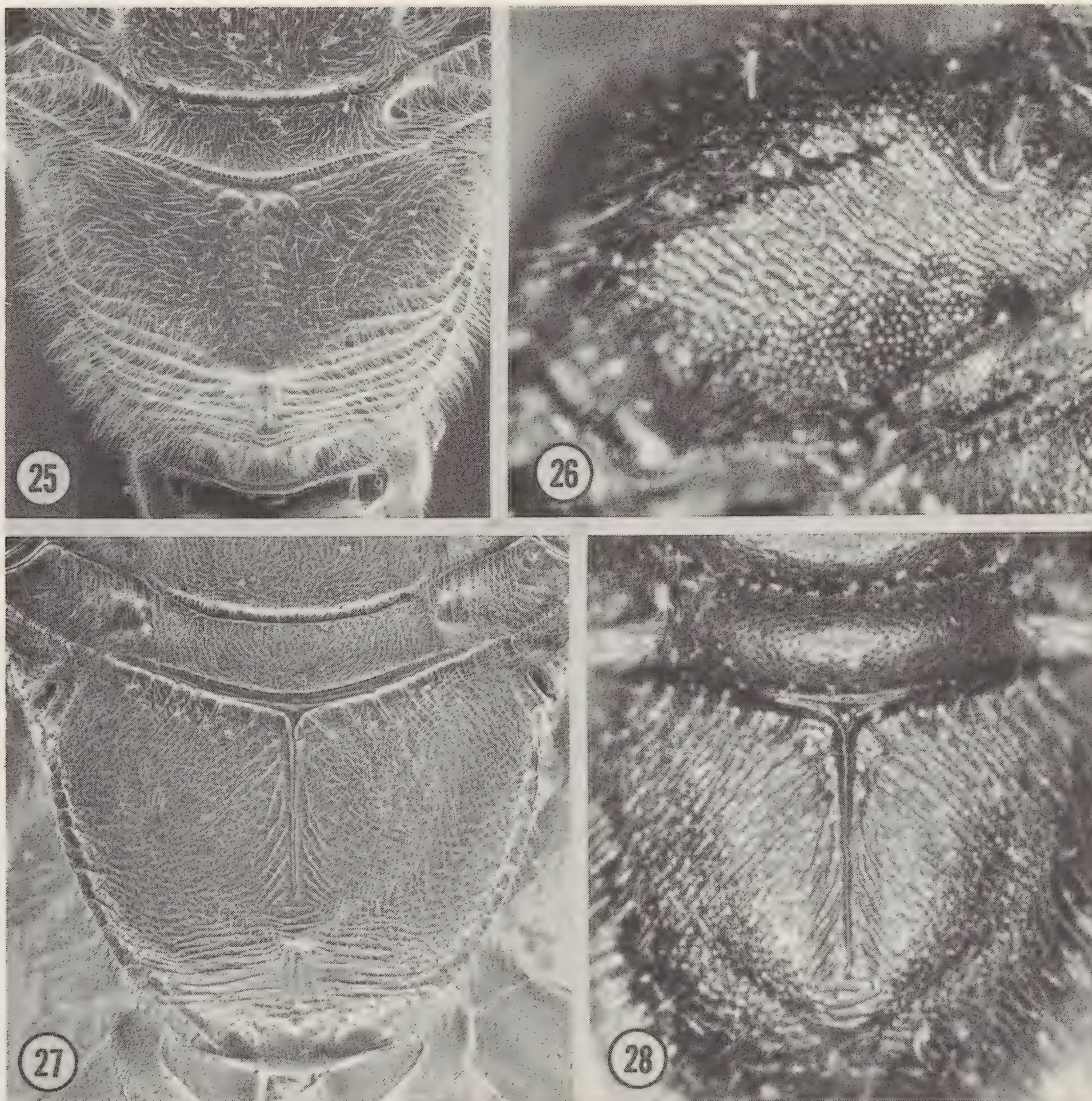
Figures 15-18. Conforme group species. 15, female face of conforme. 16, dorsal view of pronotum and scutum of conforme, arrow points to pronotal pit. 17-18, male sternum VIII of conforme and larsoni (holotype), respectively.





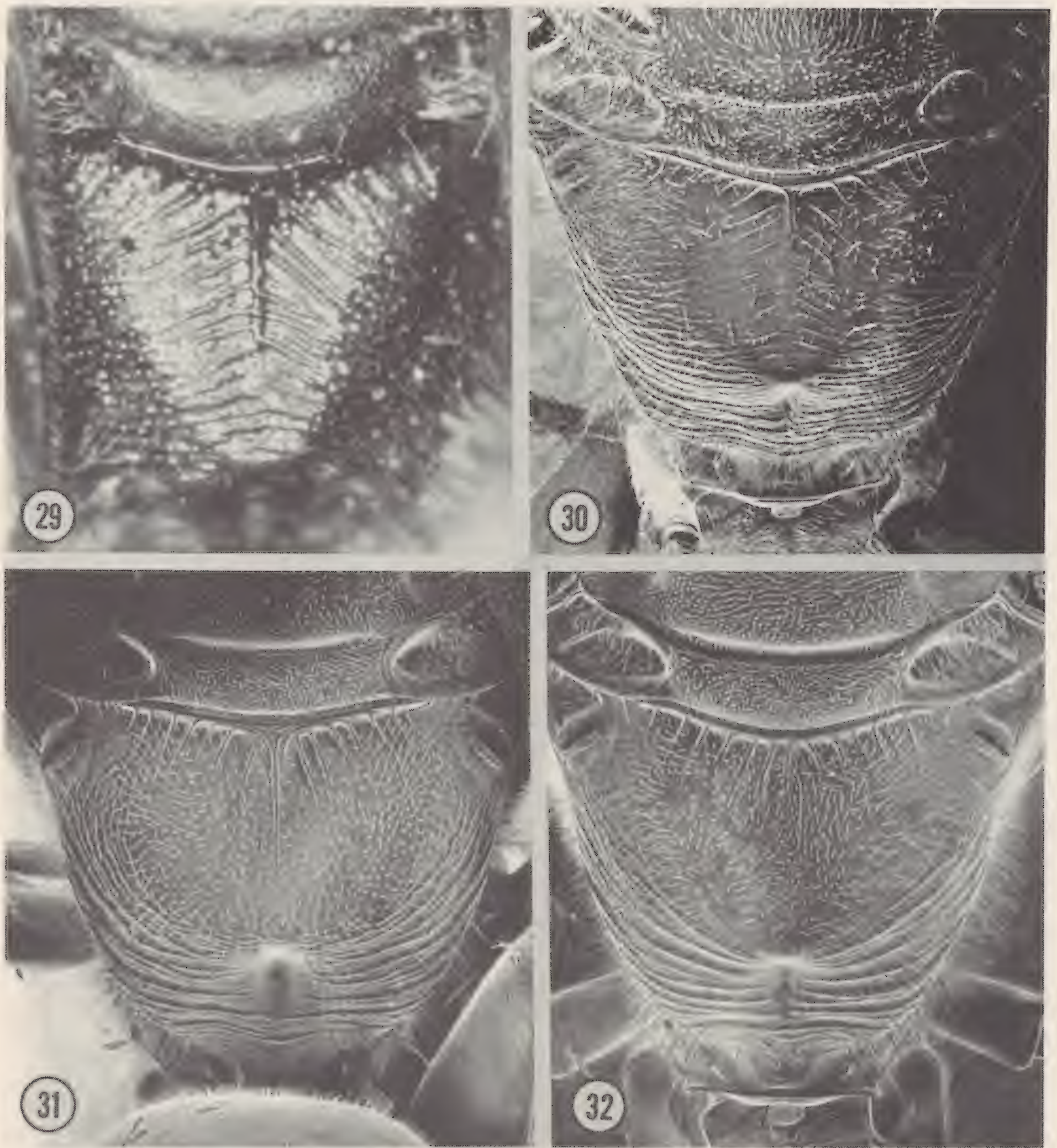
Figures 19-24. *Conforme* group, clypeal details. 19-20, *conforme*, female and male, respectively. 21-22, *larsoni*, female and male (holotype), respectively. 23, *eyvae*, female. 24, *doggonum*, female (holotype).





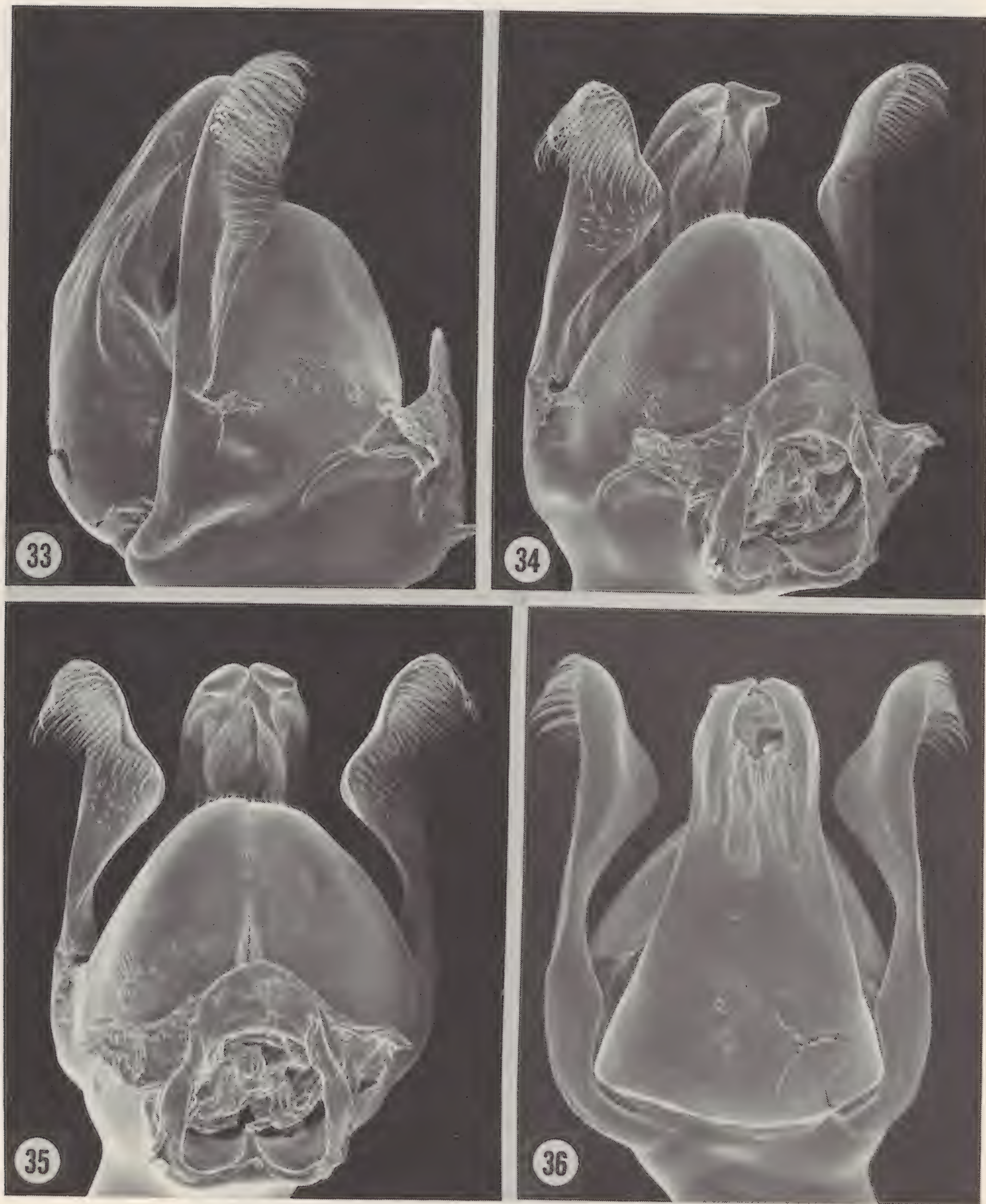
Figures 25-28. Conforme group, propodeal details. 25, propodeal dorsum of conforme. 26, right side of propodeum of larsoni showing striatopunctation. 27-28, propodeal dorsum of doggonum (holotype), 27 is SEM photograph, 28 is a photograph.





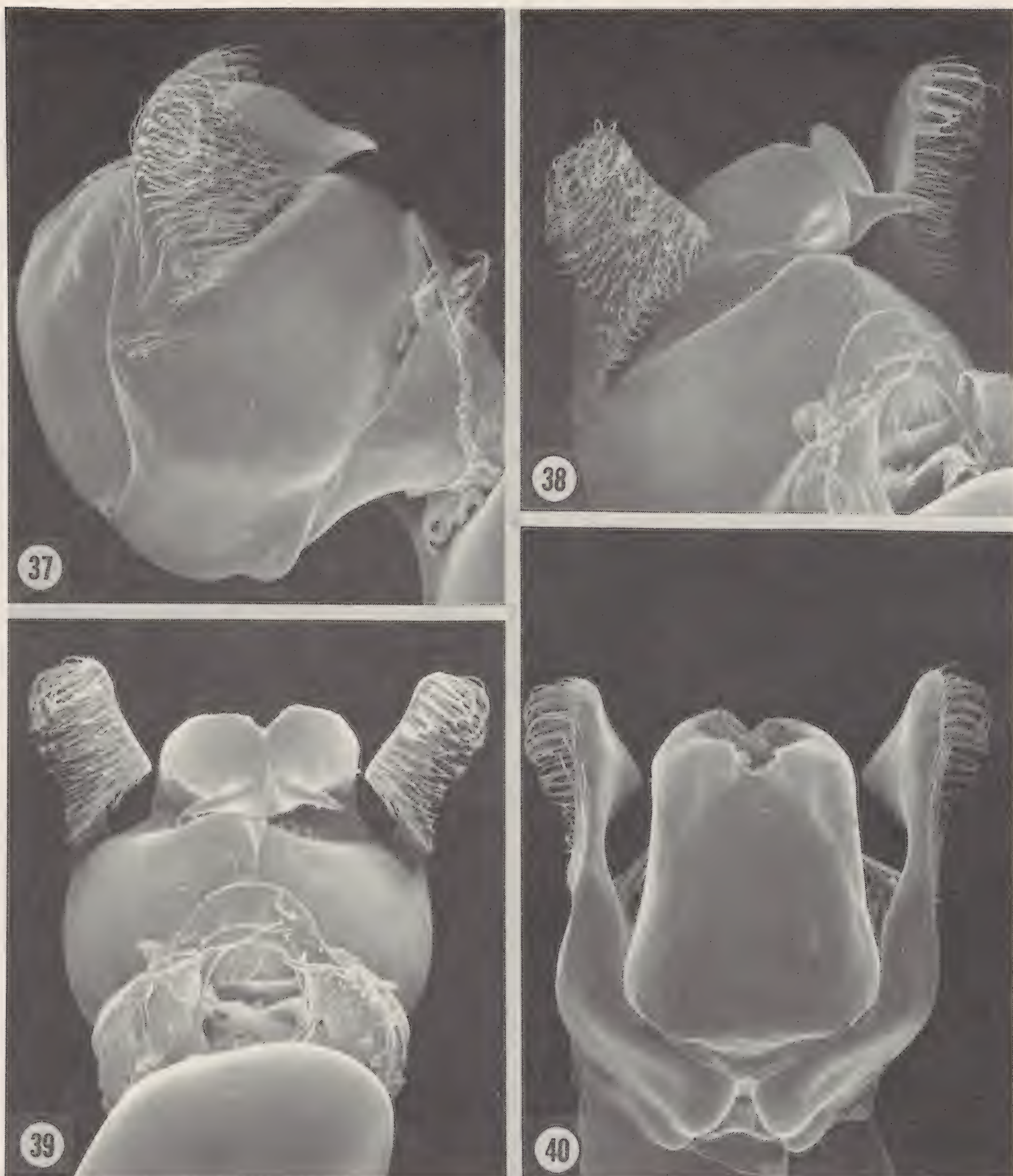
Figures 29-32. Conforme group, details of propodeal dorsum. 29-30, larsoni (29 is photograph, 30 is SEM photograph). 31, eyvae, specimen from Colombia. 32, eyvae, holotype from Ecuador.





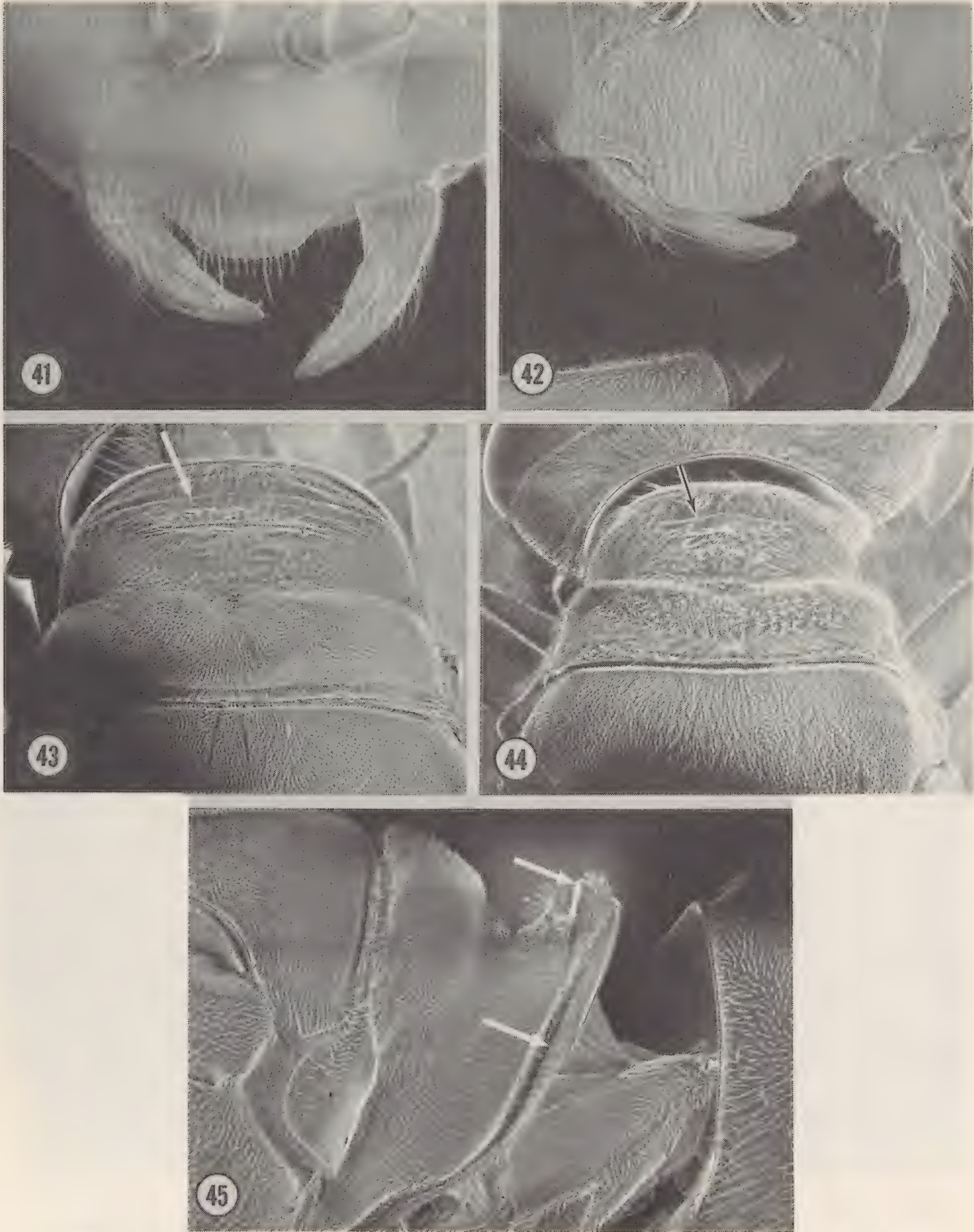
Figures 33-36. Pison conforme, male genitalia. 33, lateral view. 34, three-quarter ventral view. 35, ventral view. 36, dorsal view.





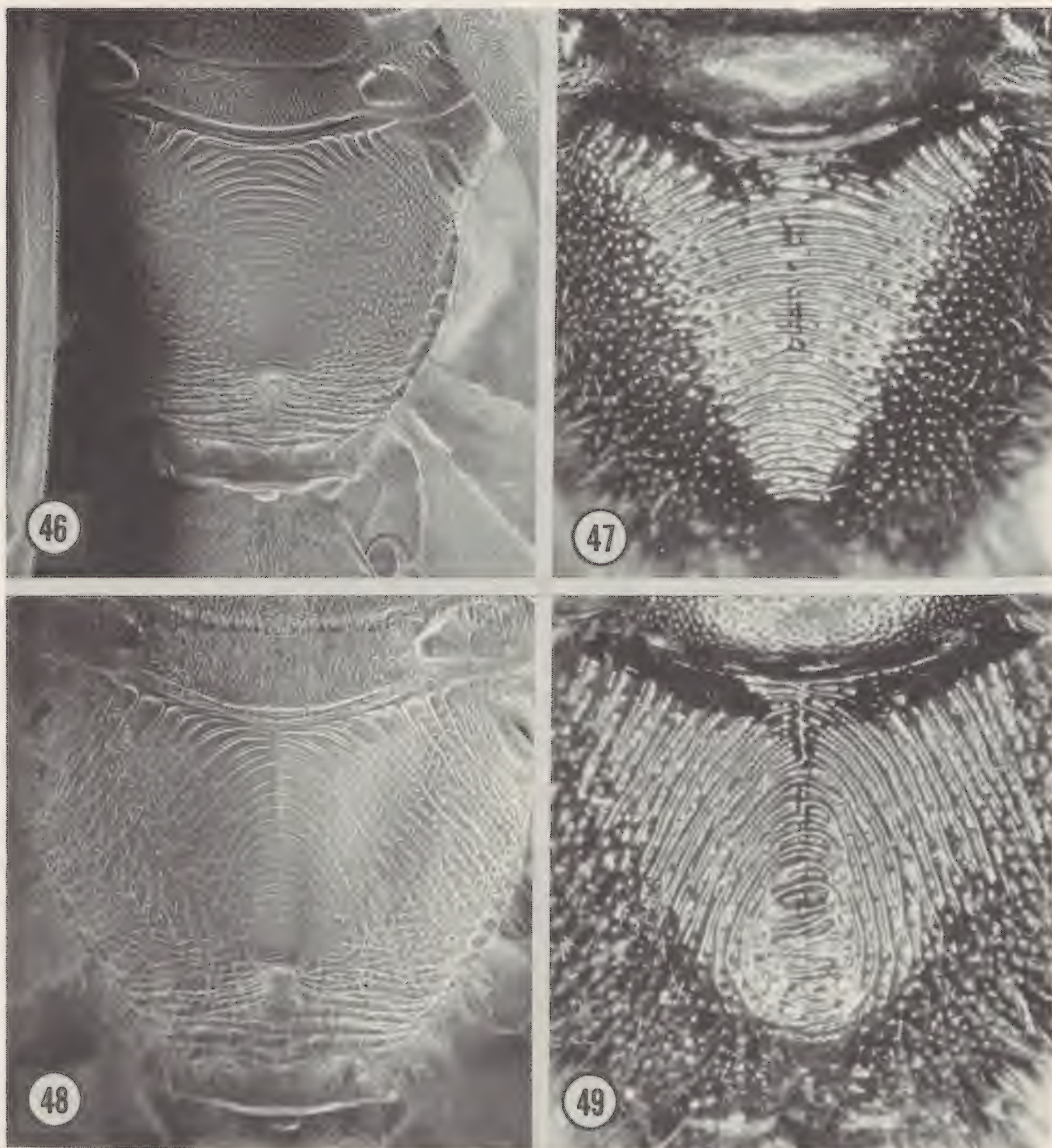
Figures 37-40. *Pison larsoni*, male genitalia (holotype). 37, lateral view. 38, three-quarter ventral view. 39, ventral view. 40, dorsal view.





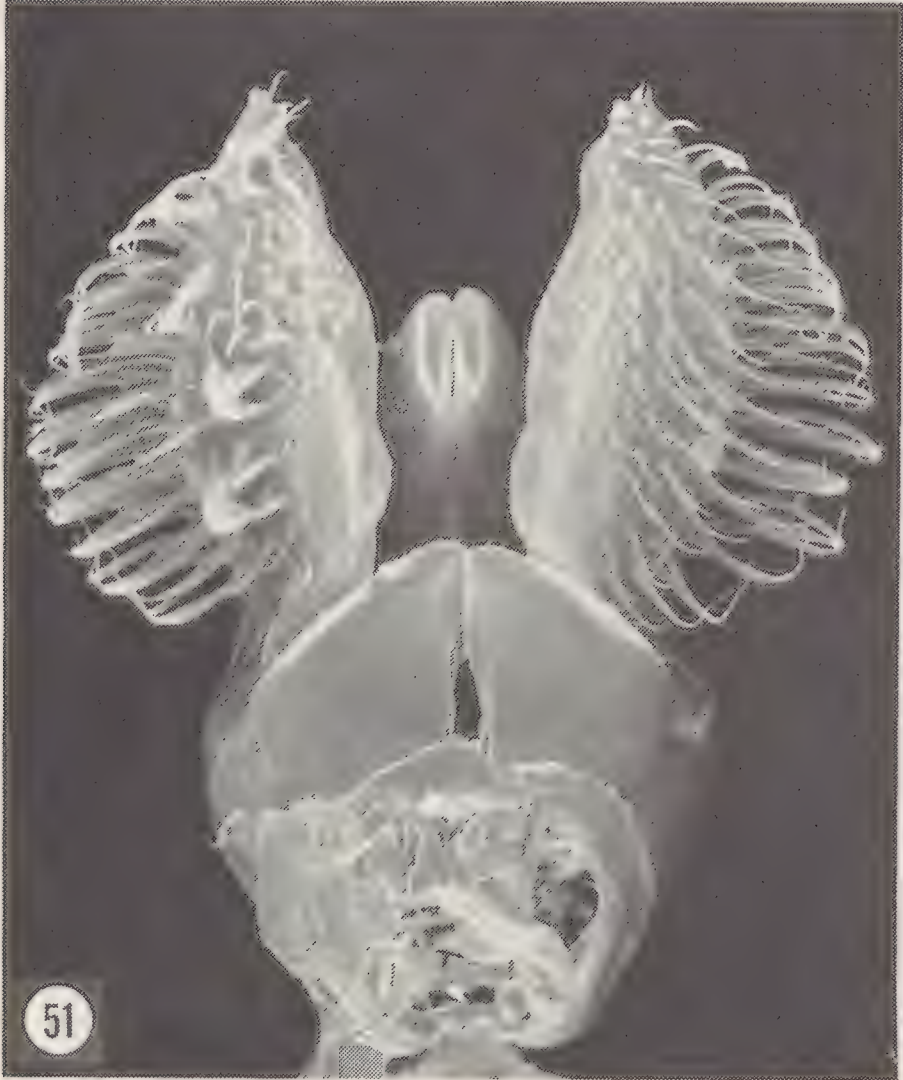
Figures 41-45. Fritzi group. 41-42, female clypeus of fritzi and nosferatu, respectively. 43-44, dorsal view of pronotum of fritzi and nosferatu, respectively. 45, right side view of pronotum of fritzi (arrows indicate lamellae).





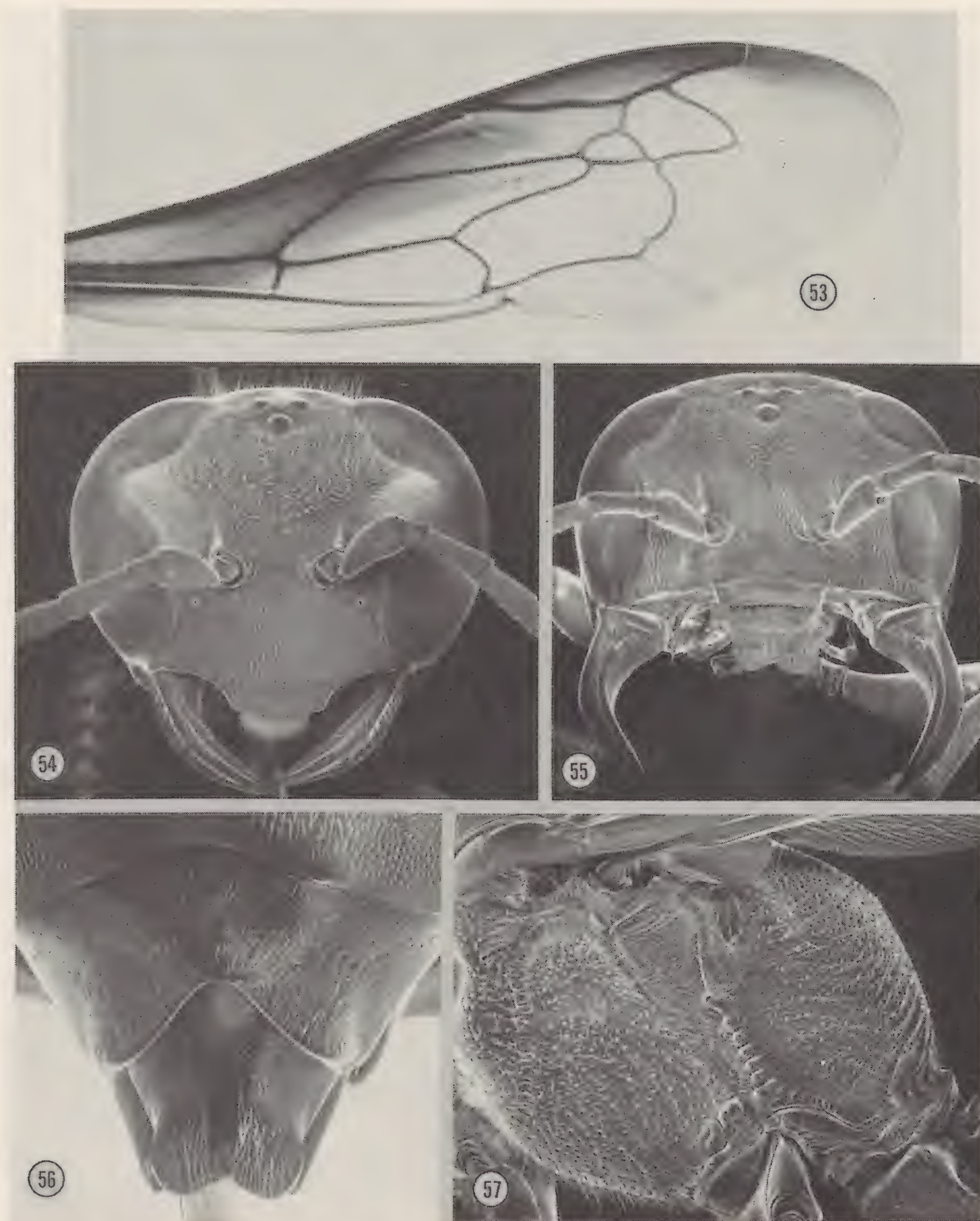
Figures 46-49. *Fritzi* group, details of propodeal dorsum. 46-47, *fritzi* (46 is SEM photograph, 47 is photograph). 48-49, *nosferatu* (49 is holotype).





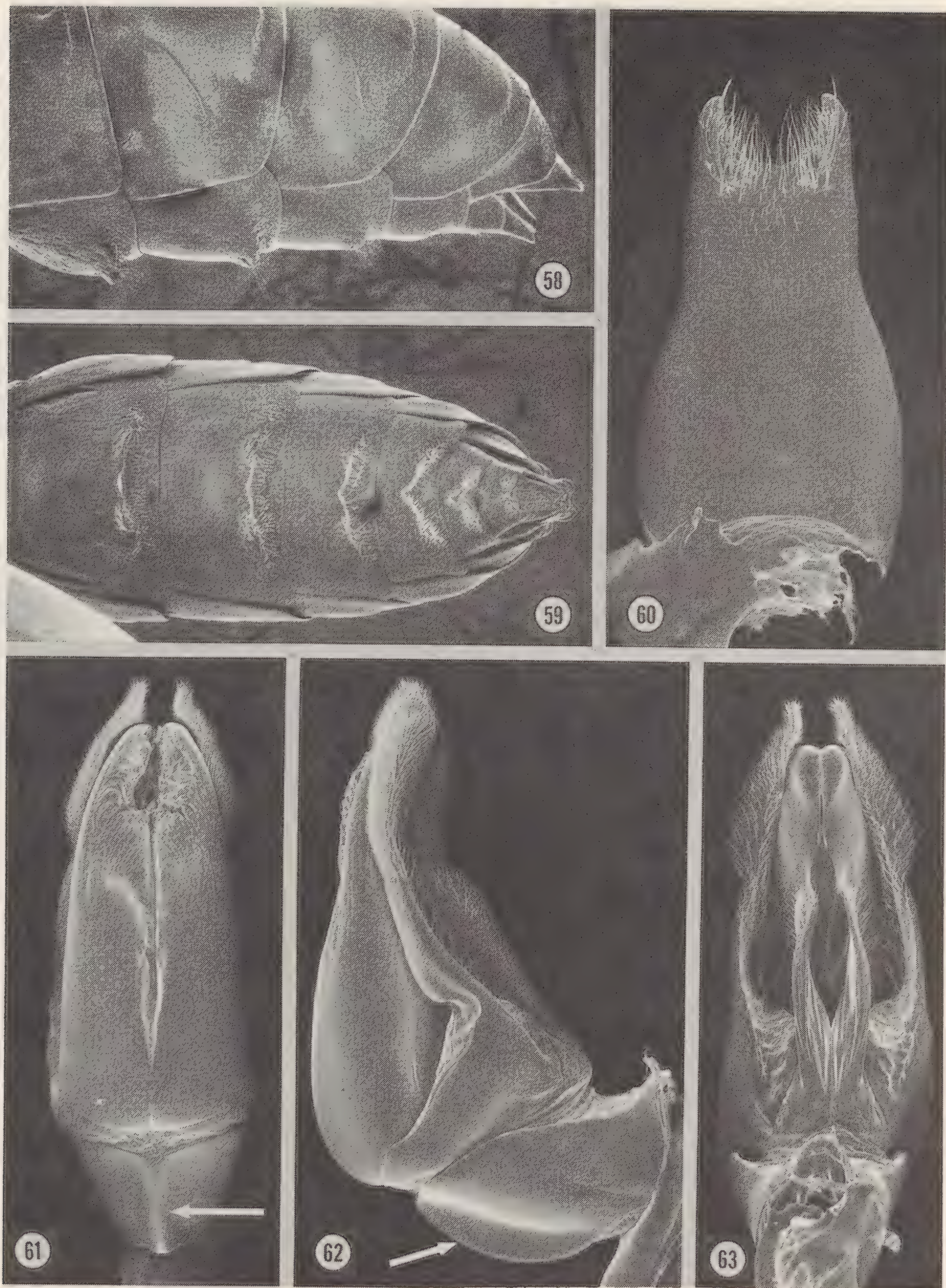
Figures 50–52. *Pison fritzi*, male genitalia. 50, lateral view. 51, ventral view. 52, dorsal view.





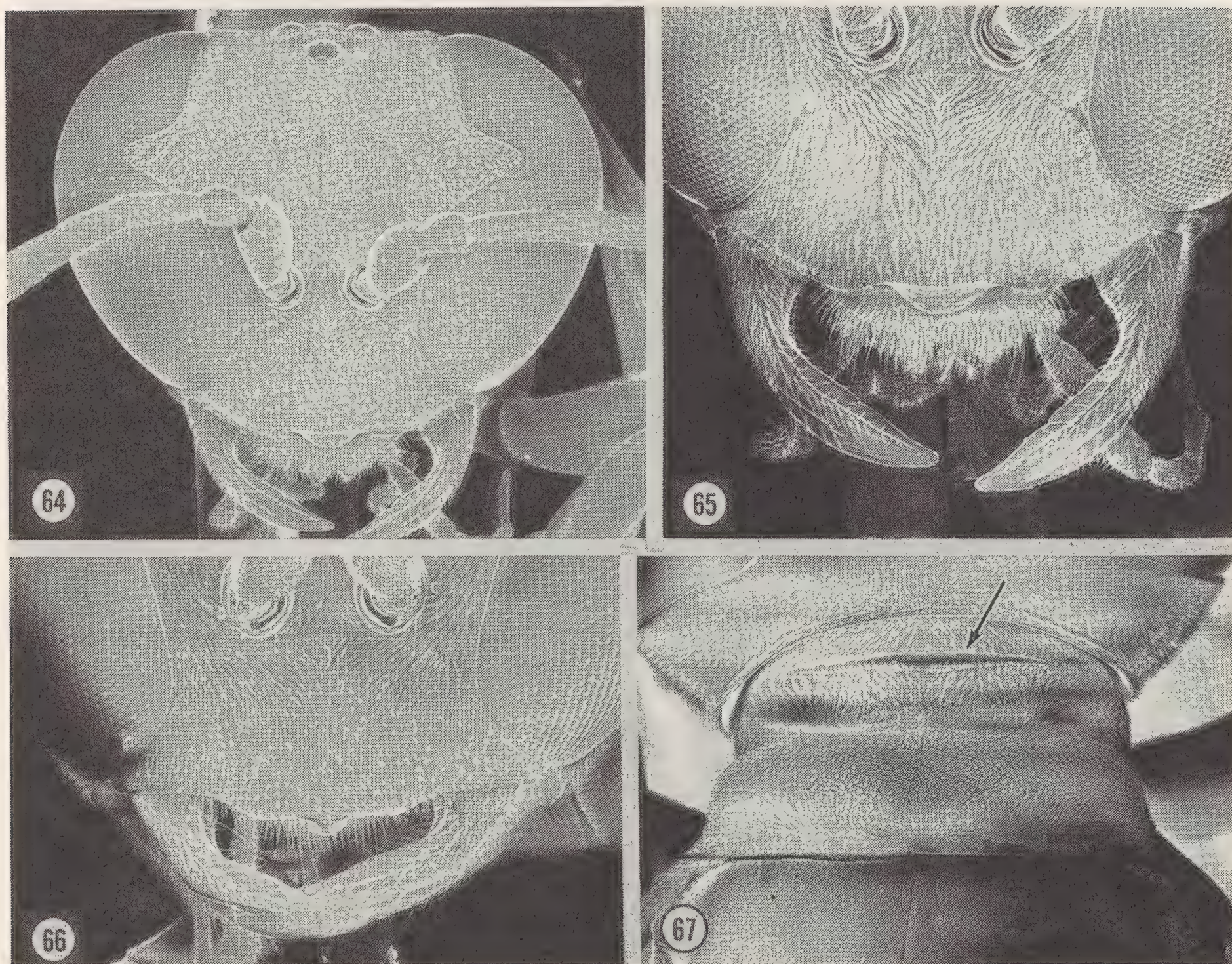
Figures 53-57. *Pison eremnon*. 53, right forewing. 54-55, faces of female and male, respectively. 56, terga VI-VII of male. 57, left side of mesopleuron and propodeum.





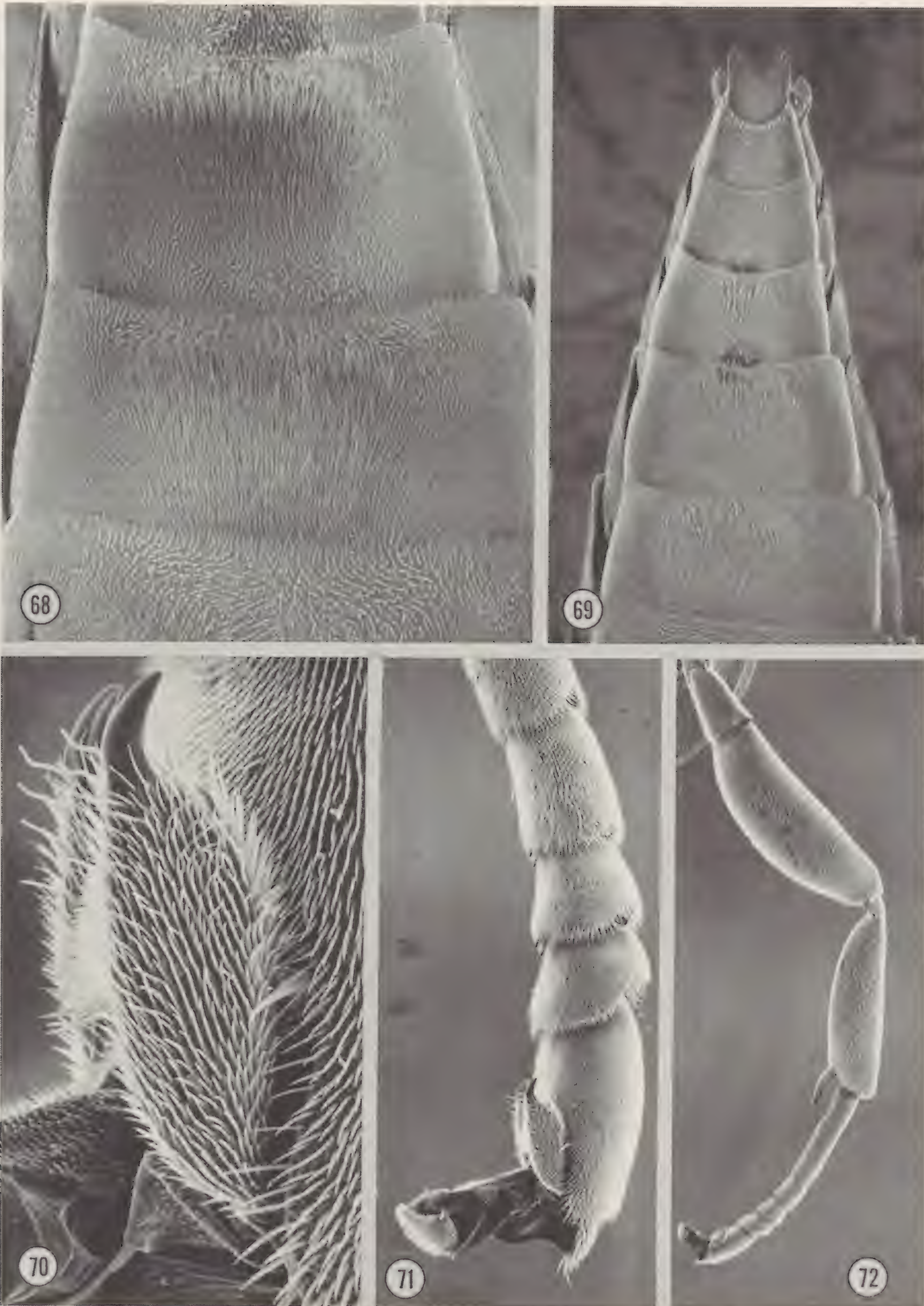
Figures 58-63. Pison eremnon. 58-59, lateral and ventral views of male abdomen, respectively. 60, male sternum VIII. 61-63, male genitalia; 61 is dorsal view, 62 is lateral view, 63 is ventral view.





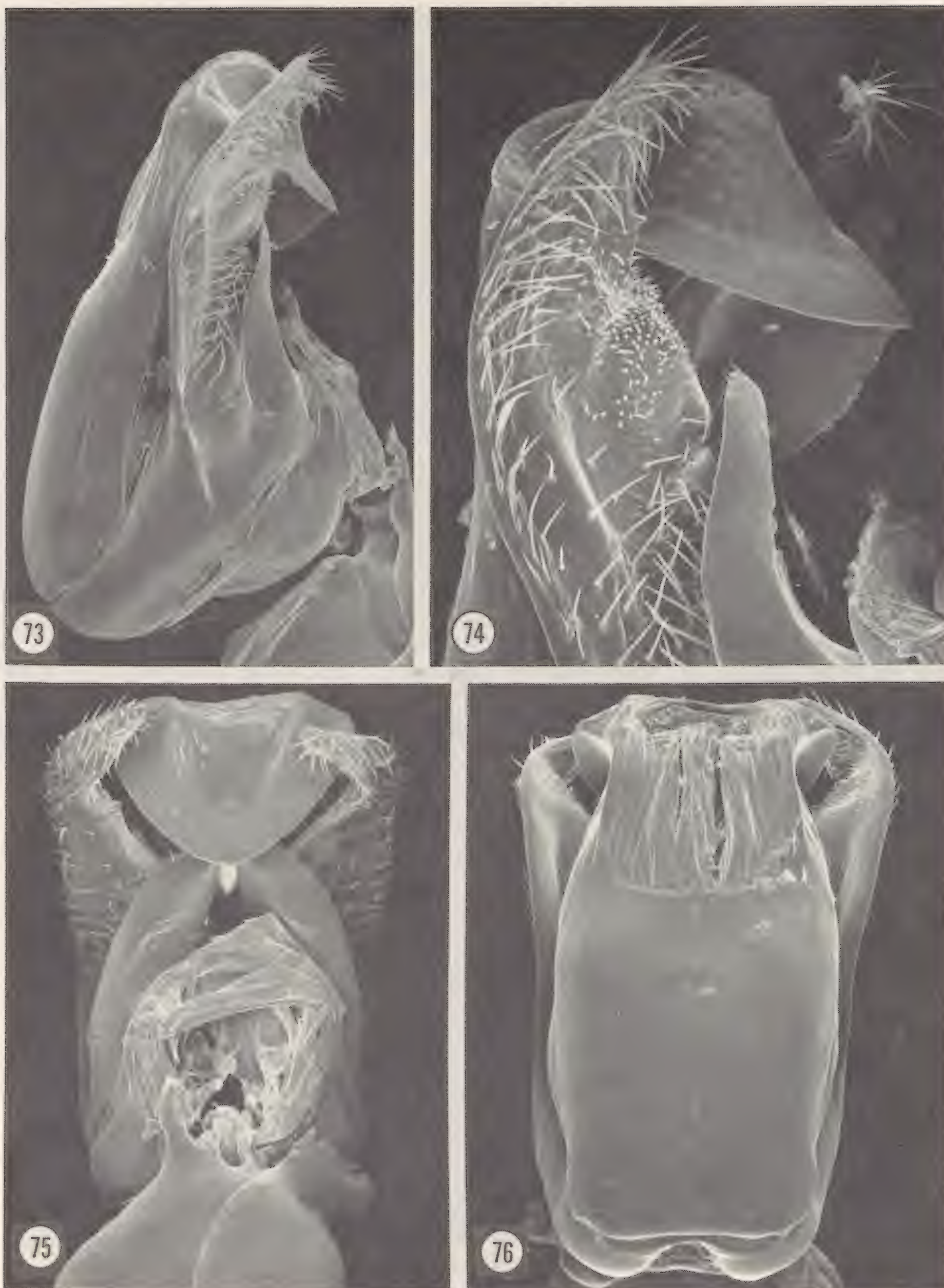
Figures 64-67. *Pison delicatum*. 64, female face. 65, female clypeus and mandibles. 66, male clypeus and mandibles. 67, pronotum in dorsal view, arrow indicates transverse pit.





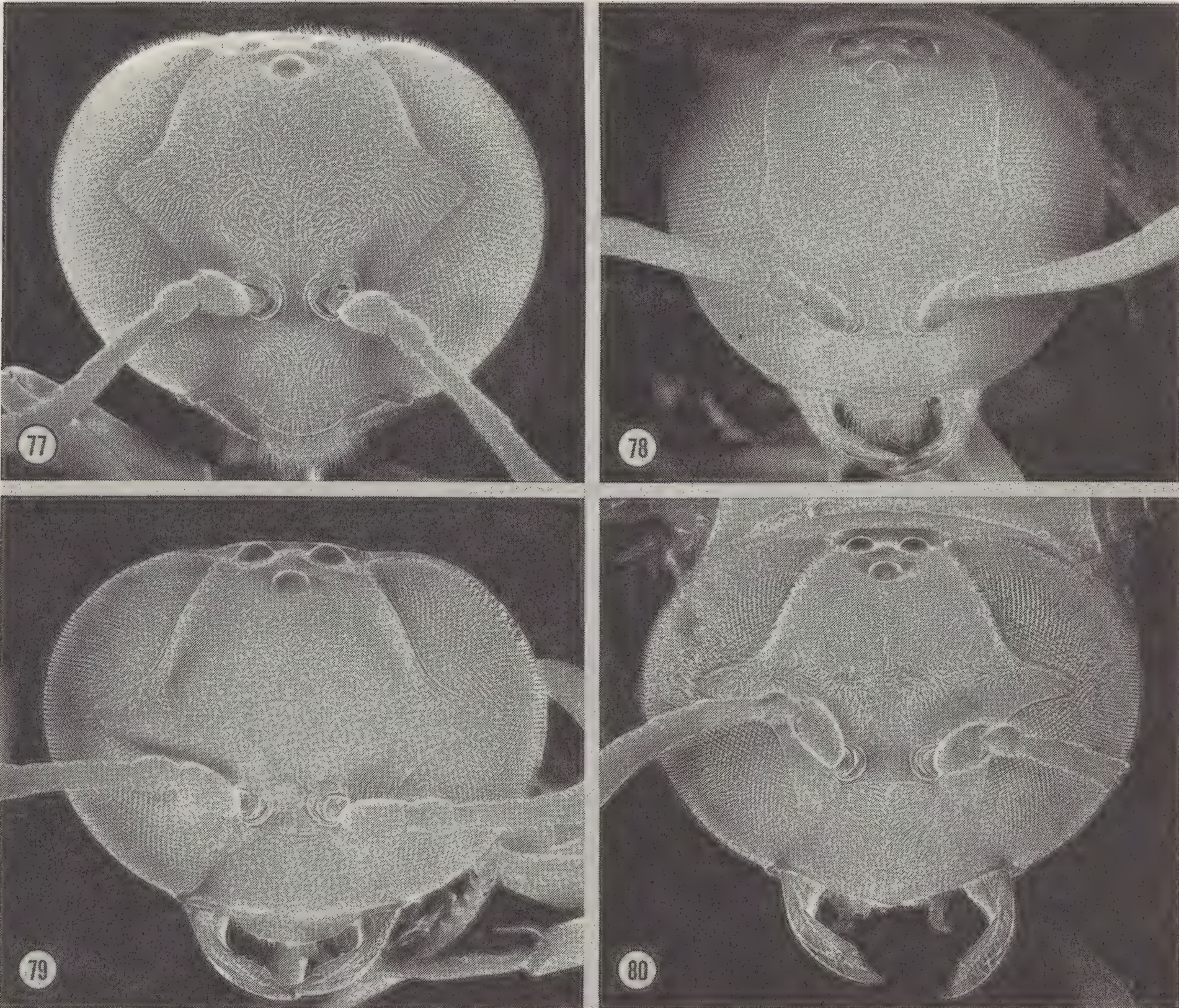
Figures 68-72. Pison delicatum. 68, male sterna III-IV. 69, male sterna III-VIII. 70, claw of foreleg. 71, foretarsomeres II-V. 72, foreleg.





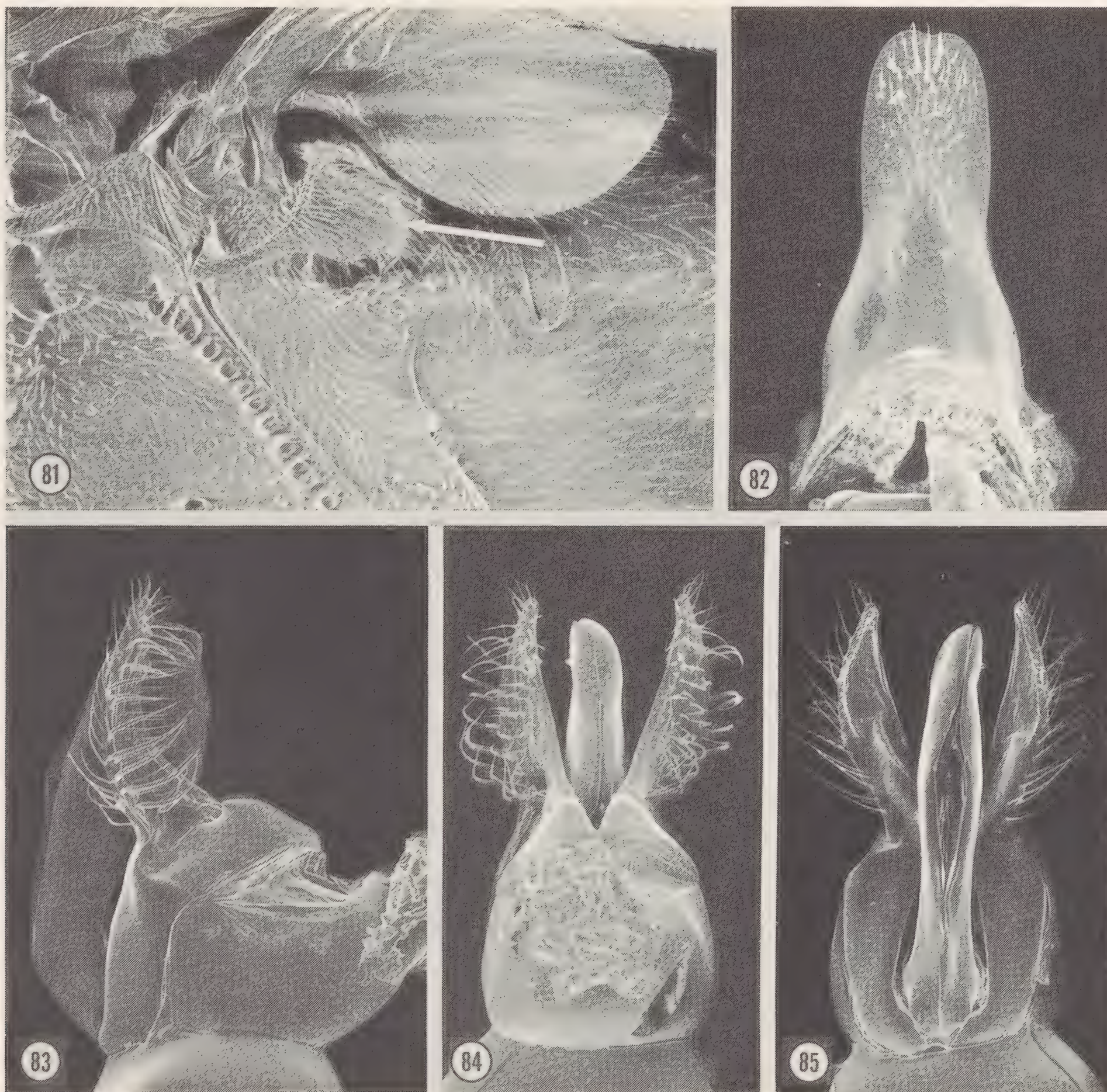
Figures 73-76. *Pison delicatum*, male genitalia. 73, lateral view. 74, three-quarter view of aedeagal head and associated structures. 75, ventral view. 76, dorsal view.





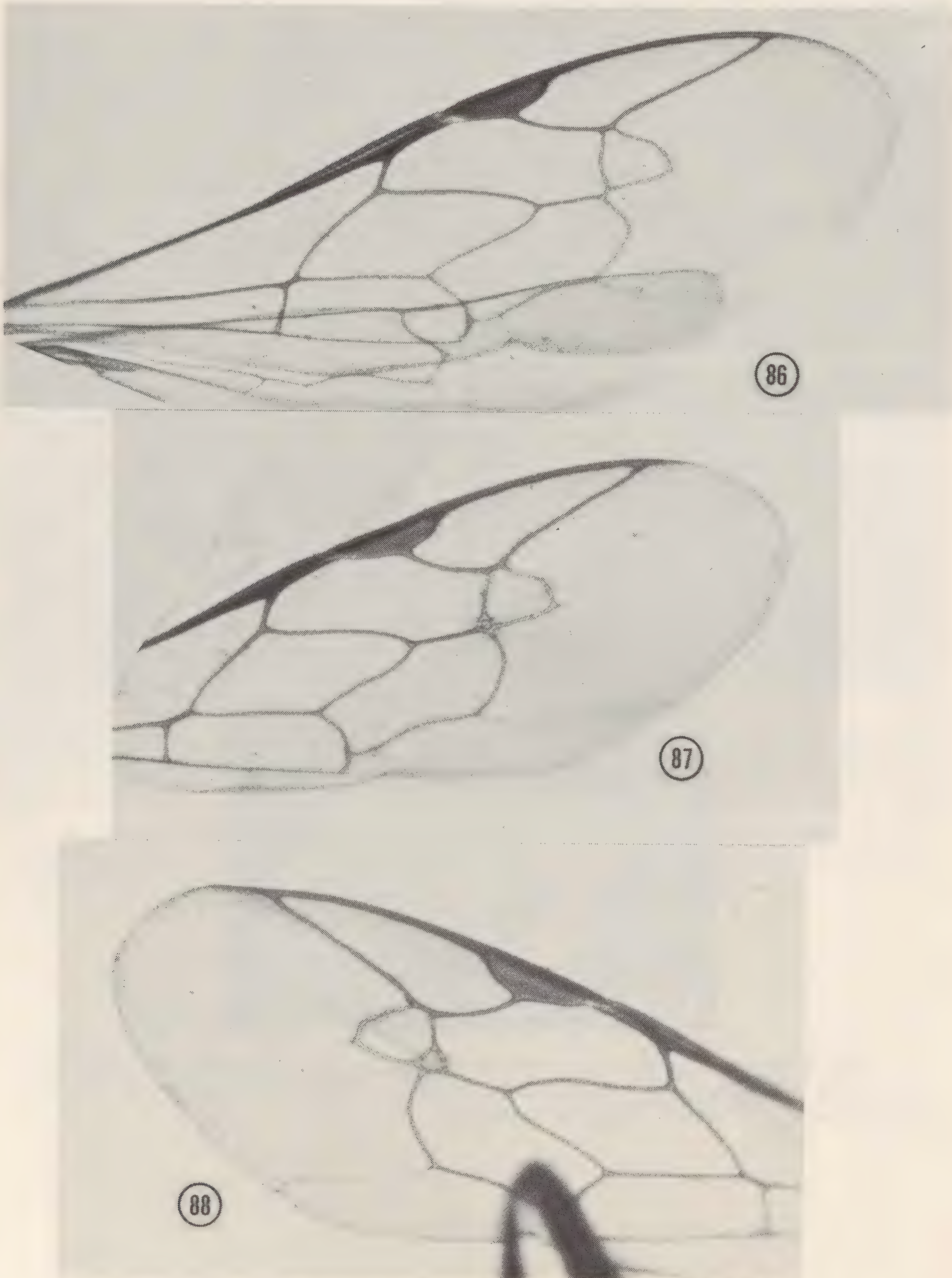
Figures 77-80. Female faces. 77, agile. 78, abathes (holotype). 79, krombeini. 80, neotropicum.





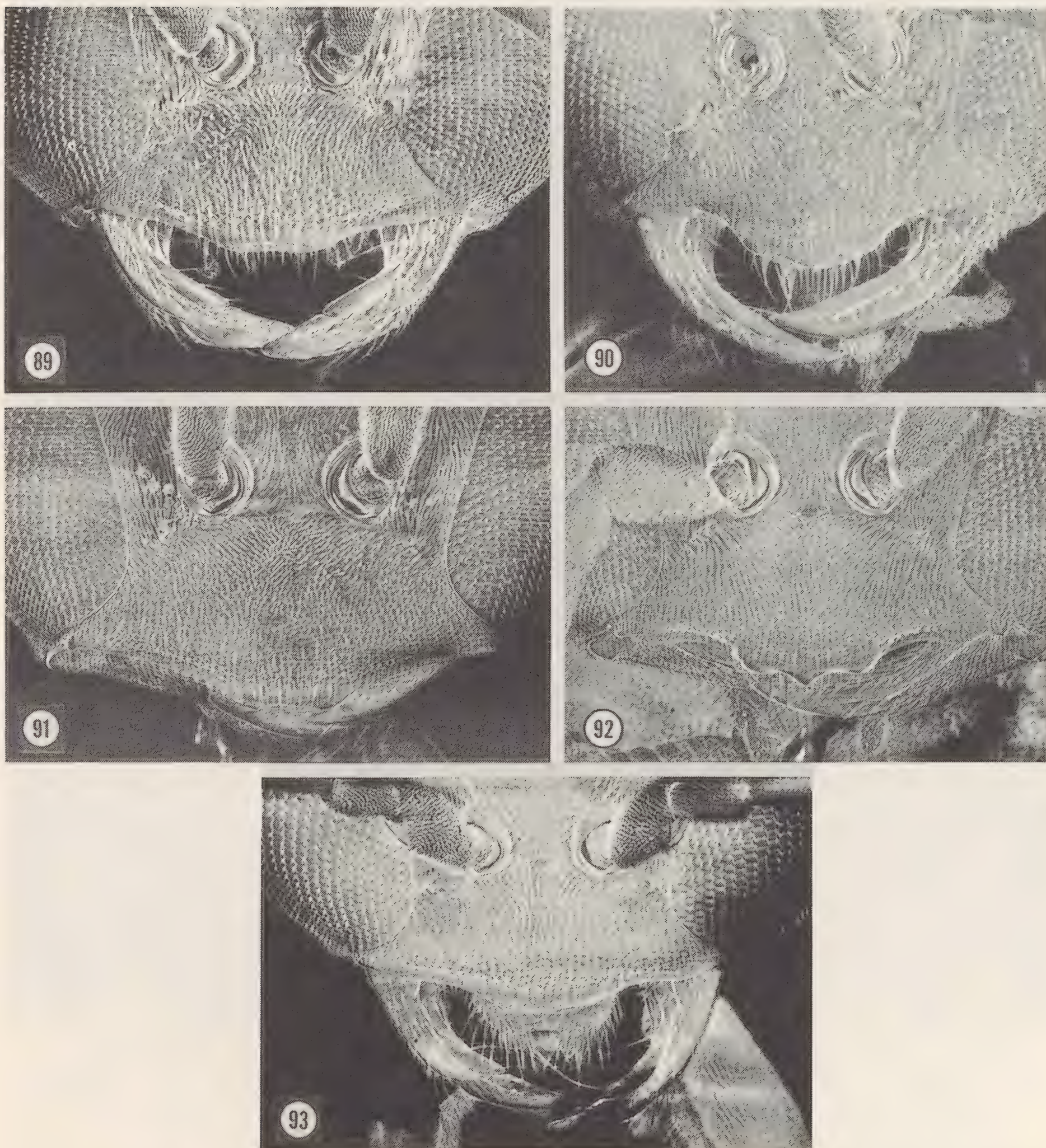
Figures 81-85. *Pison agile*. 81, left side of thorax showing metapleural flange (arrow). 82, male sternum VIII. 83-85, male genitalia; 83 is lateral view, 84 is ventral view, 85 is dorsal view.





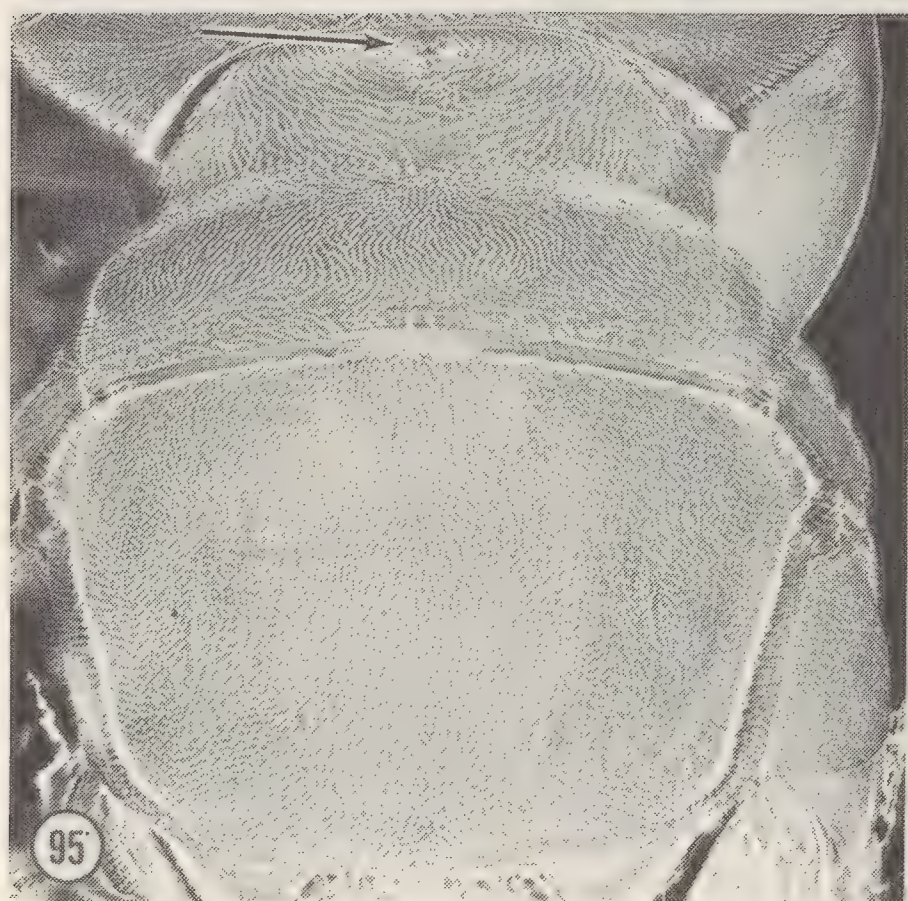
Figures 86-88. Stangei group, forewing. 86, stangei. 87-88, right and left wings of single male specimen with three submarginal cells.





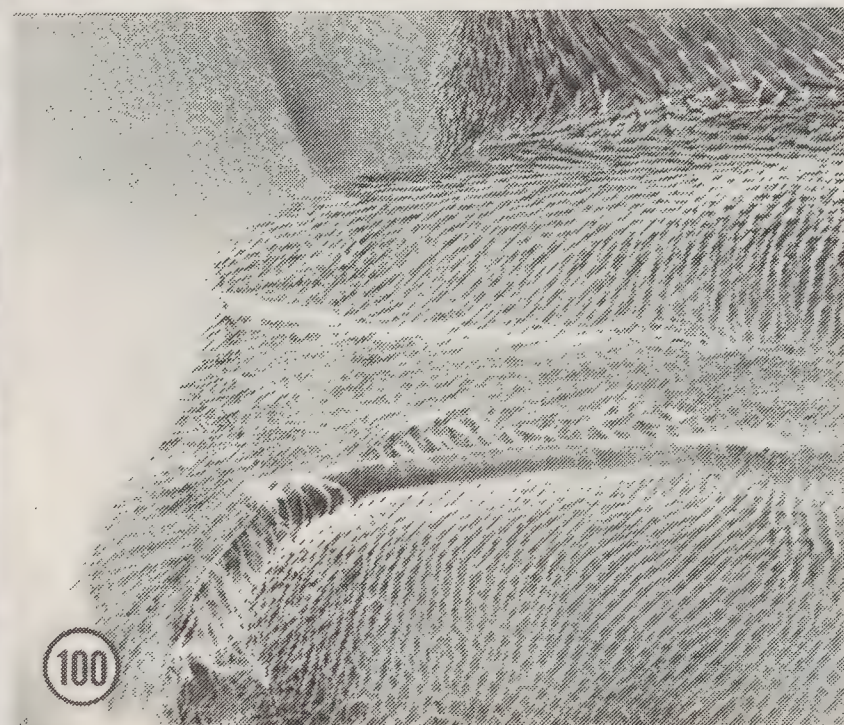
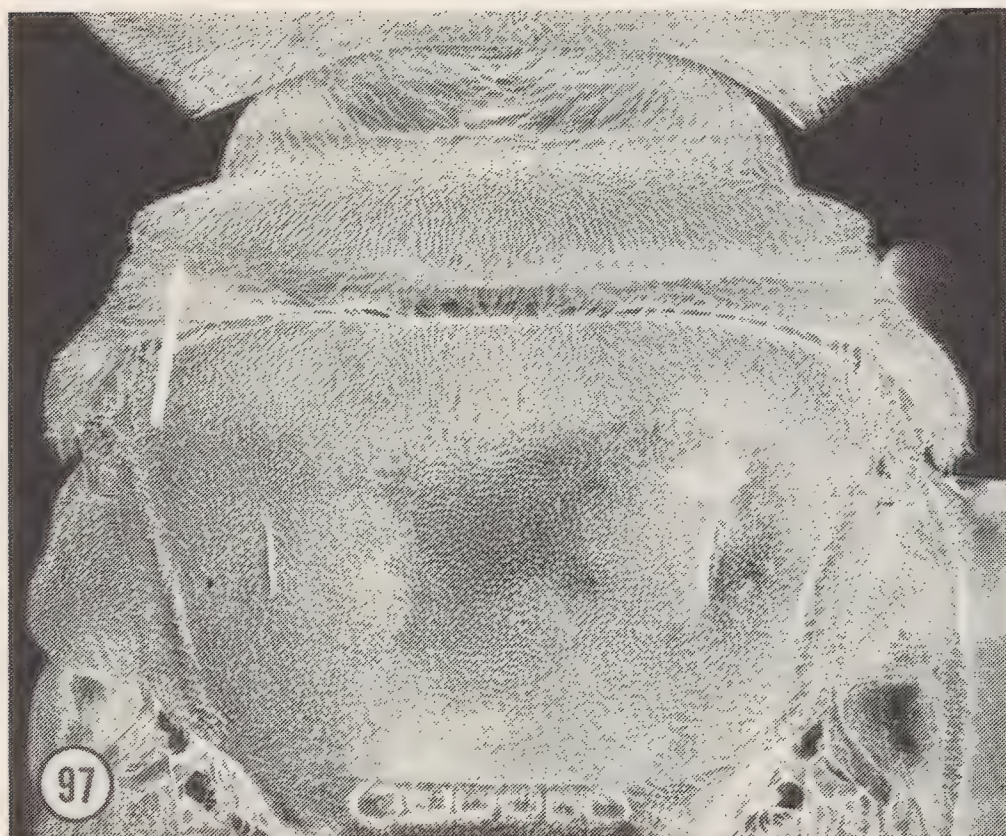
Figures 89-93. *Stangei* group, details of clypeus and mandibles. 89-90, female and male of *plaumanni*, respectively. 91-92, female and male of *stangei*, respectively. 93, female of *abathes* (holotype).





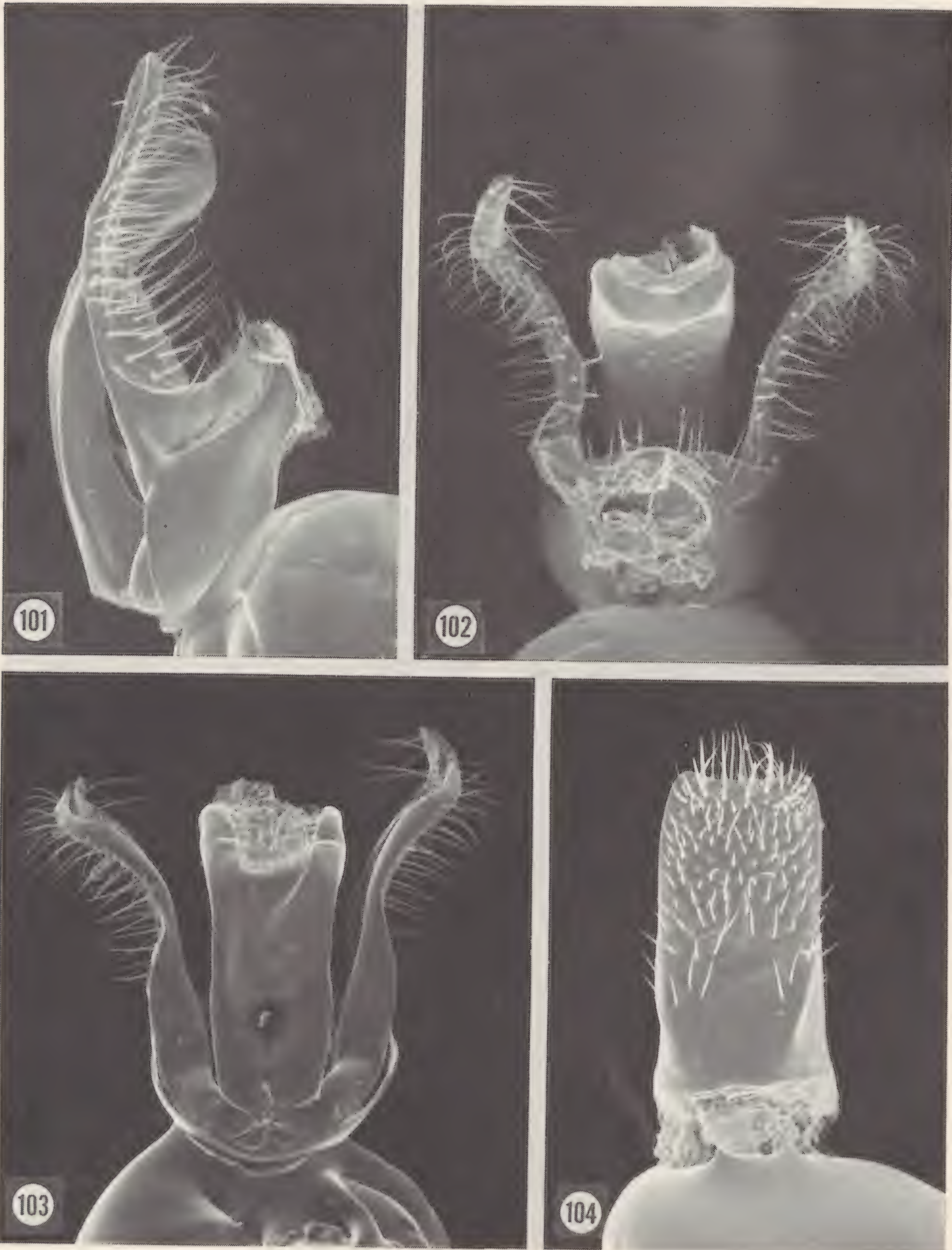
Figures 94-96. Stangei group, thoracic details in dorsal view. 94, left half of pronotal collar of stangei. 95-96, pronotum and scutum of plaumanni and stangei, respectively (arrow indicates pronotal pit).





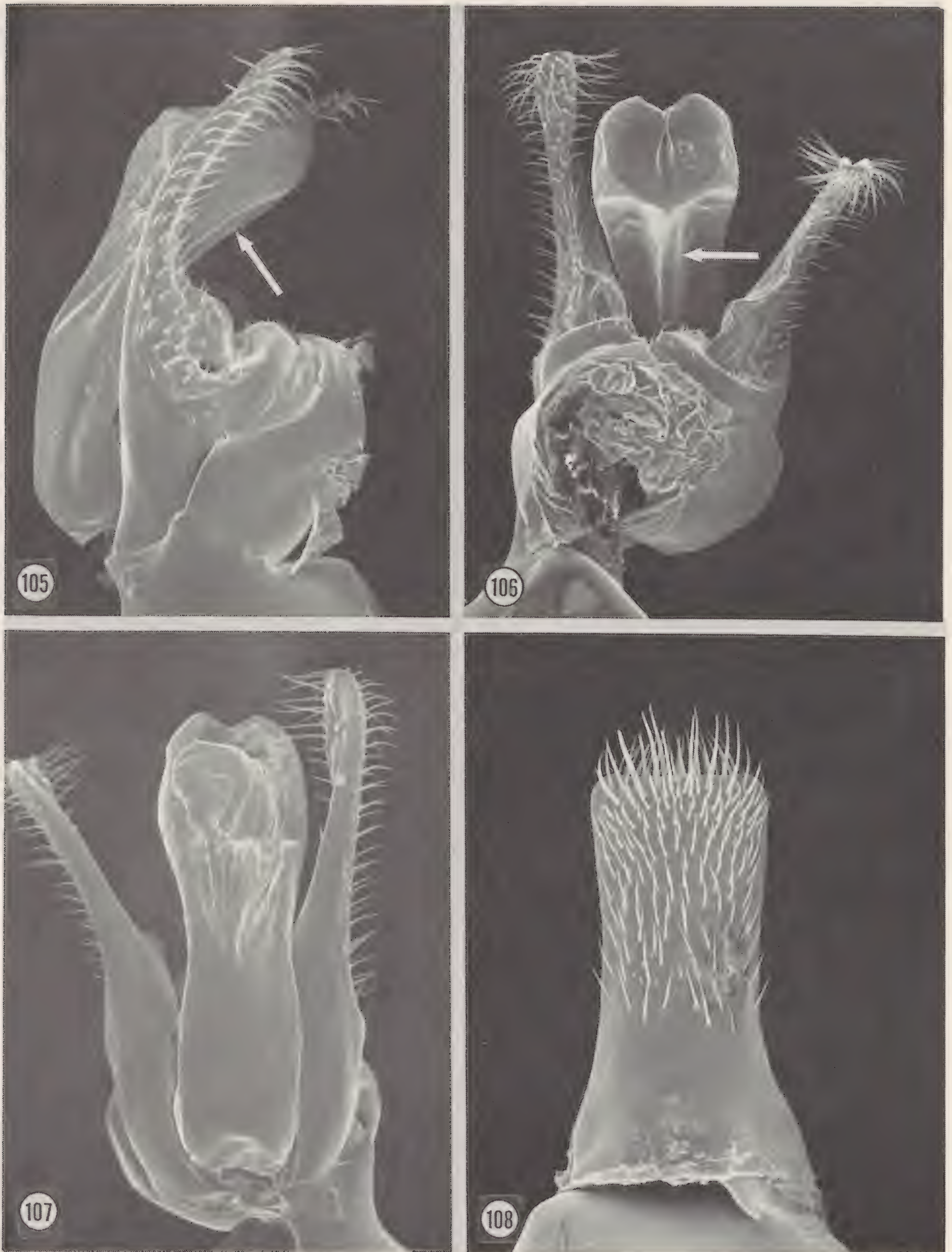
Figures 97-100. Stangei group, thoracic details in dorsal view. 97, pronotal collar and scutum of duckei (arrow indicates ridge). 98, closeup of left half of pronotal collar of duckei. 99, pronotal collar and scutum of abathes, holotype (arrow indicates ridge). 100, closeup of left half of pronotal collar of abathes.





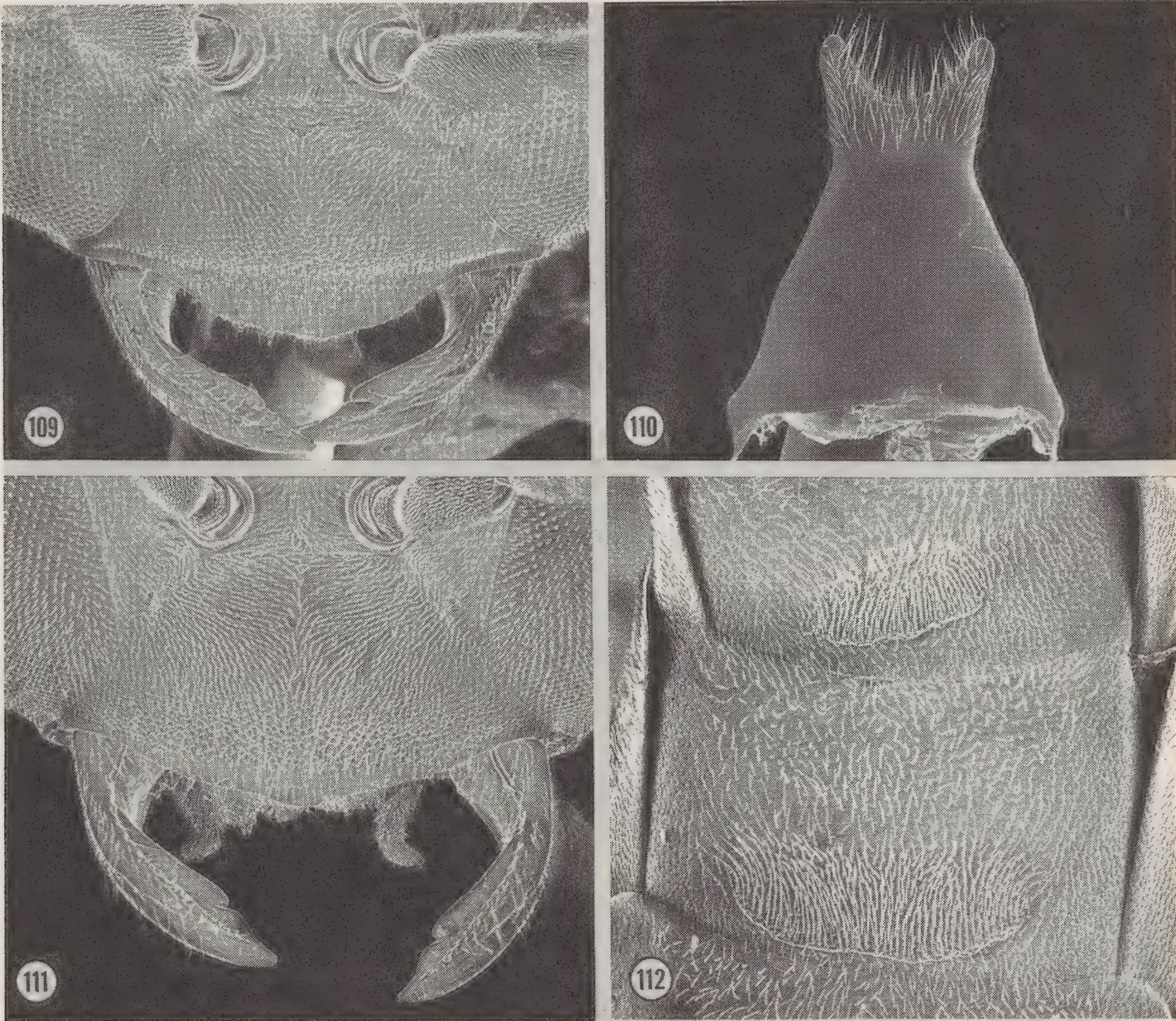
Figures 101-104. Pison plaumanni, male details. 101-103, genitalia; 101 is lateral view, 102 is ventral view, 103 is dorsal view. 104, sternum VIII.





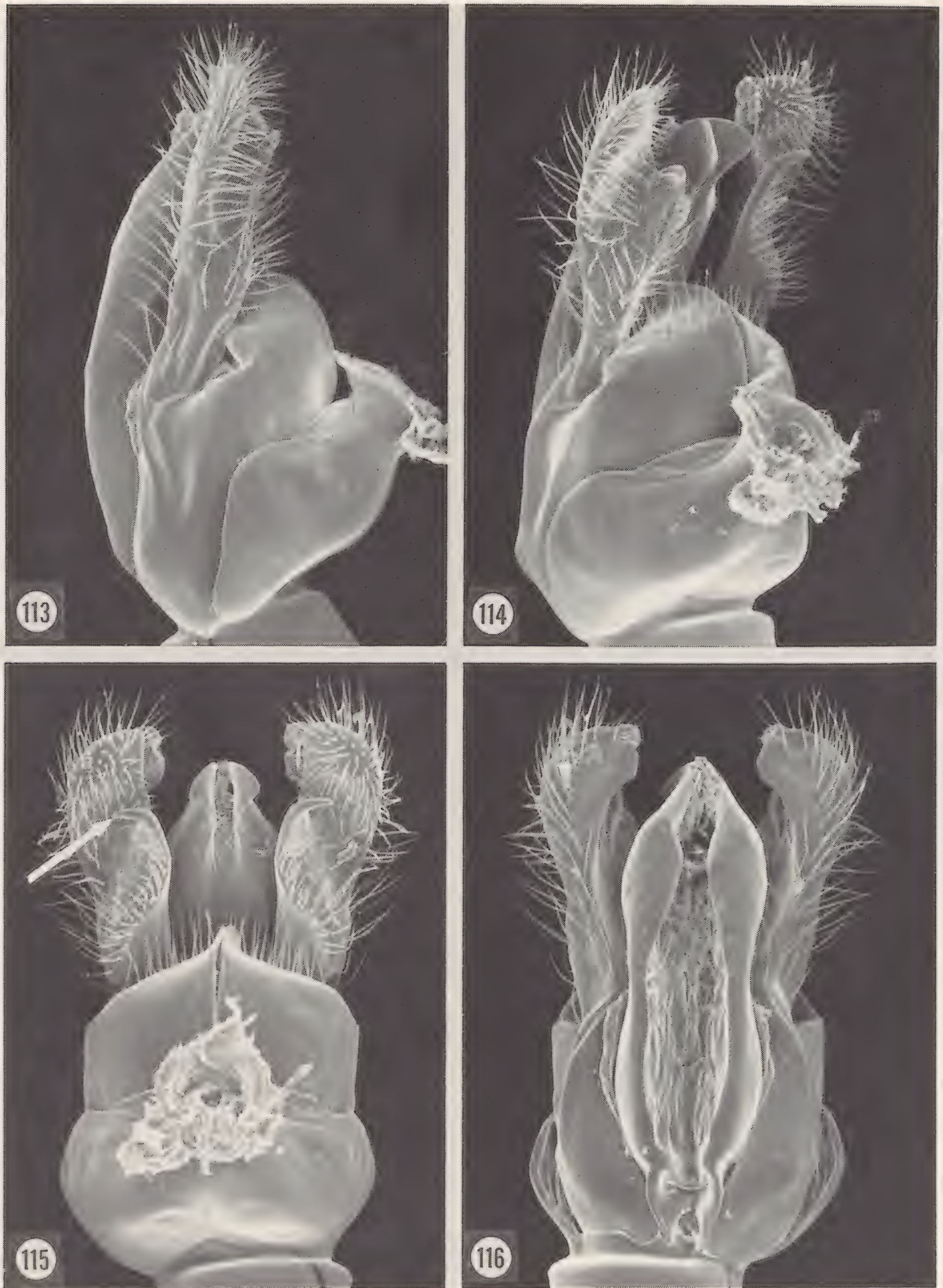
Figures 105-108. *Pison stangei*, male details. 105-107, genitalia; 105 is lateral view, 106 is ventral view, 107 is dorsal view. 108, sternum VIII.





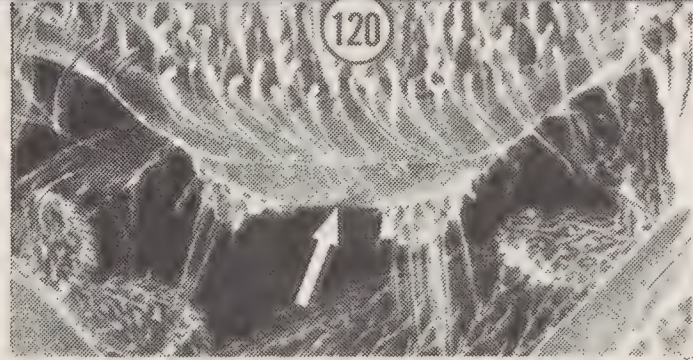
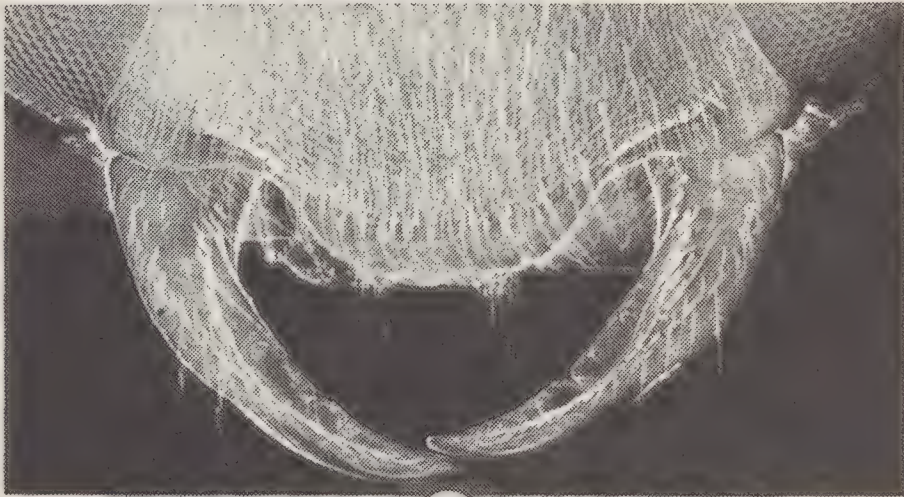
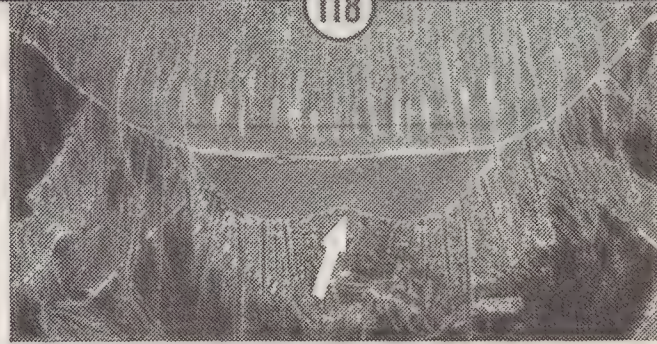
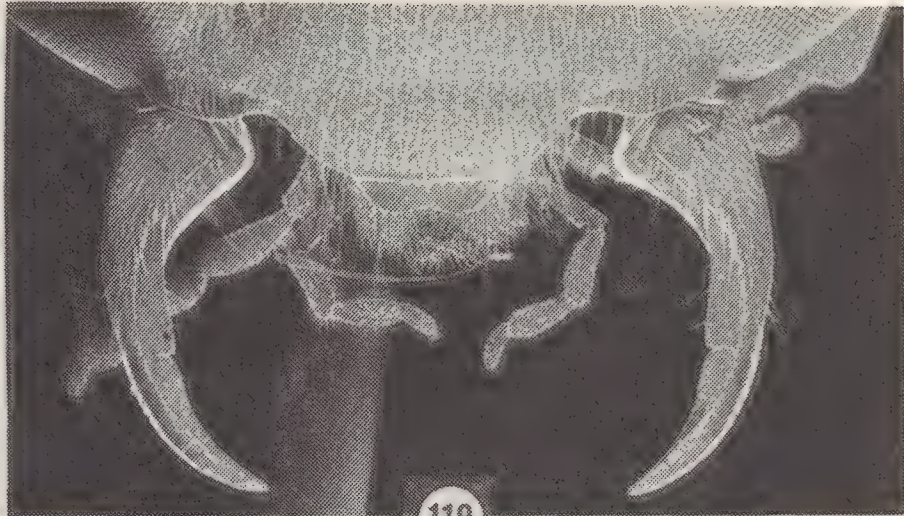
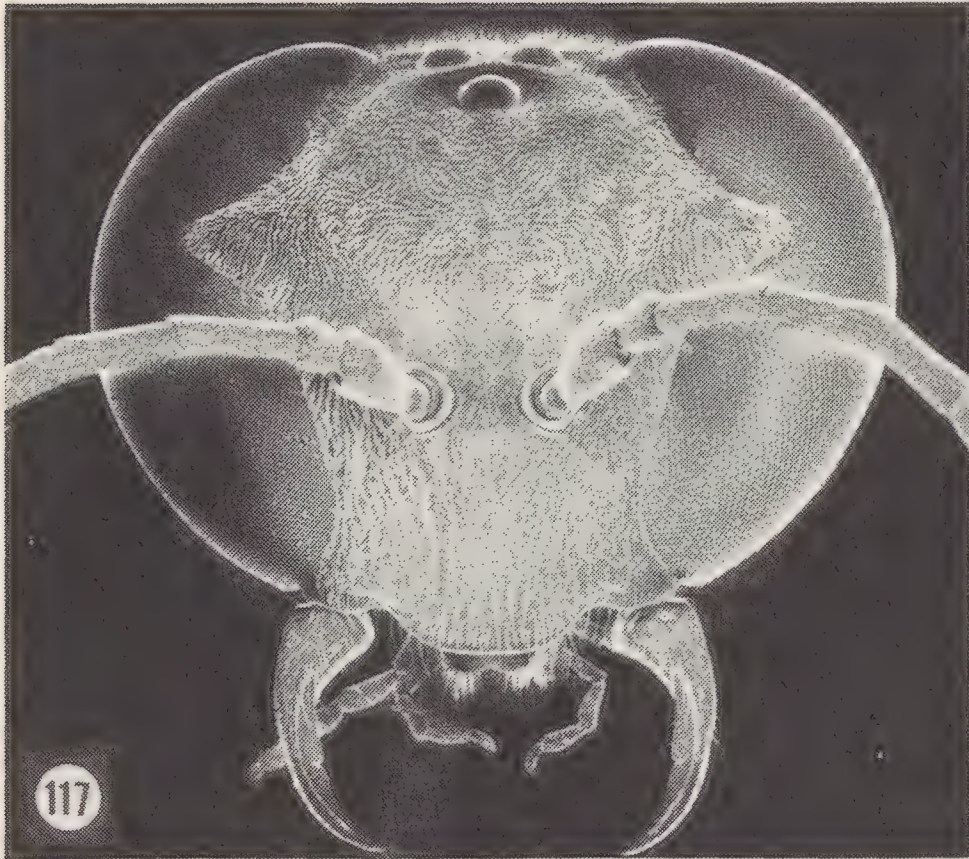
Figures 109-112. Krombeini group details. 109, female clypeus and mandibles of krombeini. 110, male sternum VIII of krombeini. 111, female clypeus and mandibles of neotropicum. 112, male sterna III-IV of krombeini showing depressions.





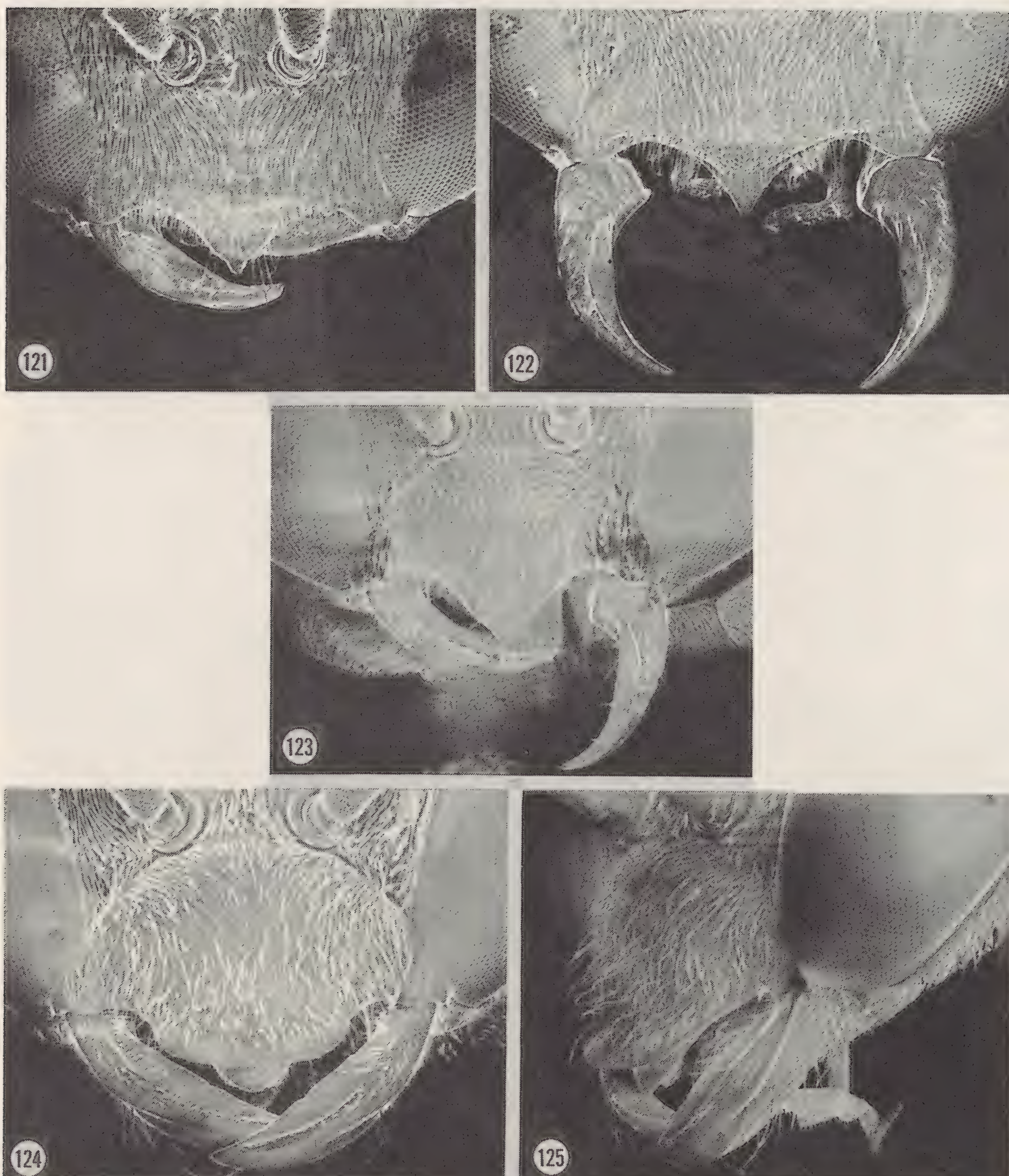
Figures 113-116. *Pison krombeini*, male genitalia. 113, lateral view. 114, three-quarter ventral view. 115, ventral view. 116, dorsal view.





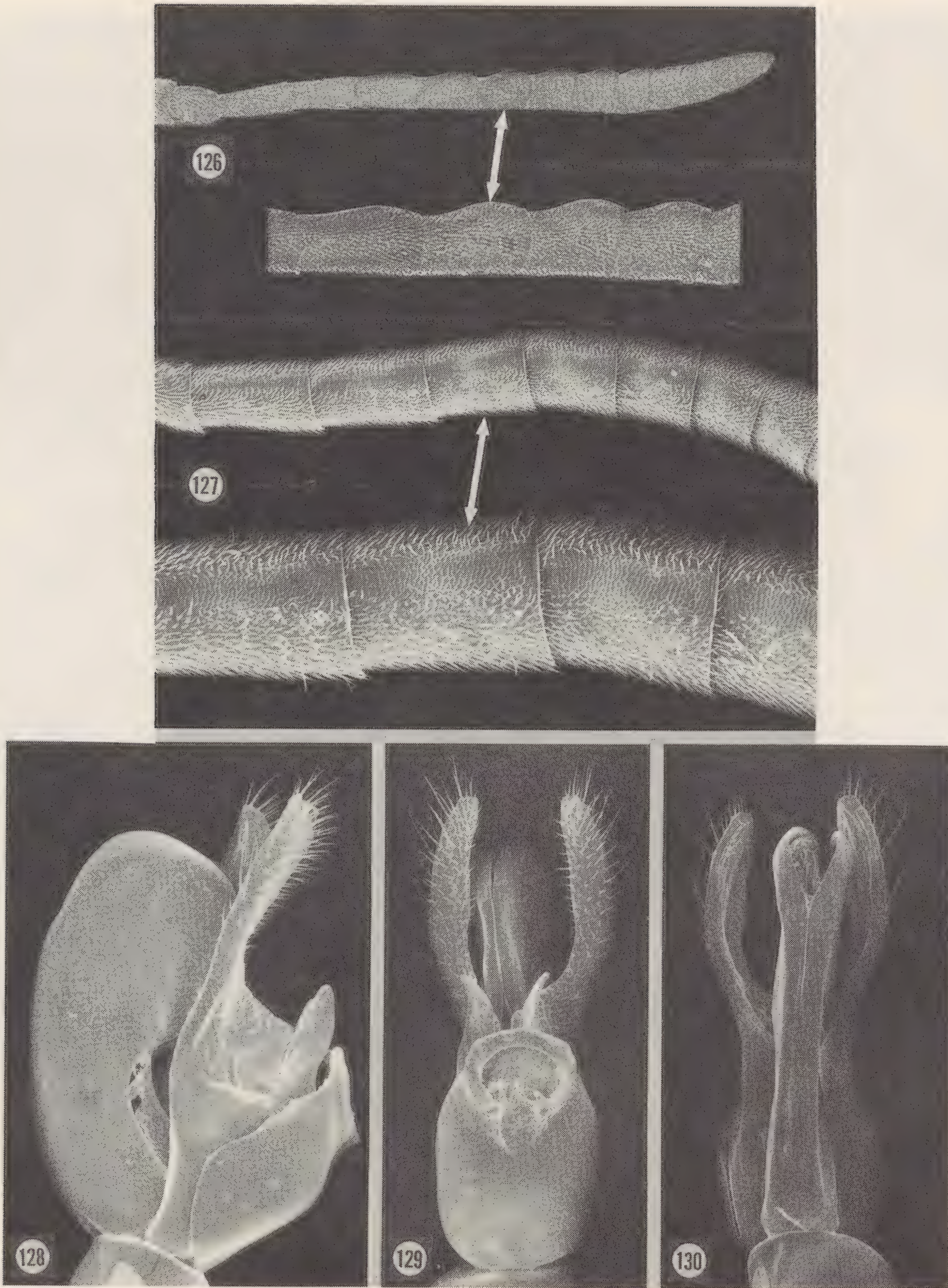
Figures 117-120. Euryops group, head details. 117, female face of eu. 118, female clypeus and mandible of eu with closeup view of clypeal lobe. 119, female face of euryops. 120, female clypeus and mandible of euryops with closeup view of clypeal lobe.





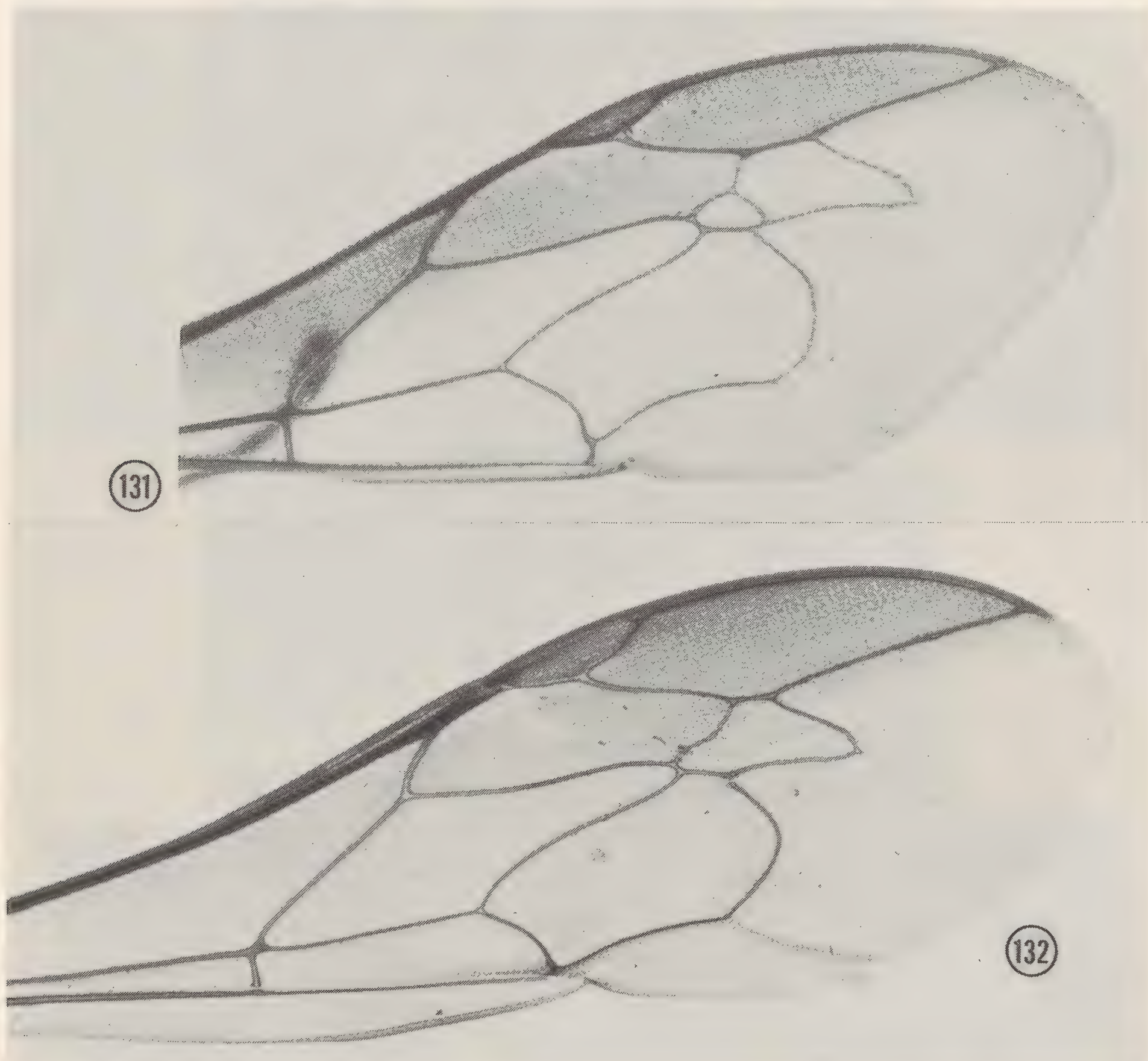
Figures 121-125. Euryops group, details of clypeus and mandible. 121-123, male of eu, euryops, and styphopteron, respectively. 124, female of styphopteron. 125, three-quarter view of female of styphopteron showing reflexed clypeal lobe.





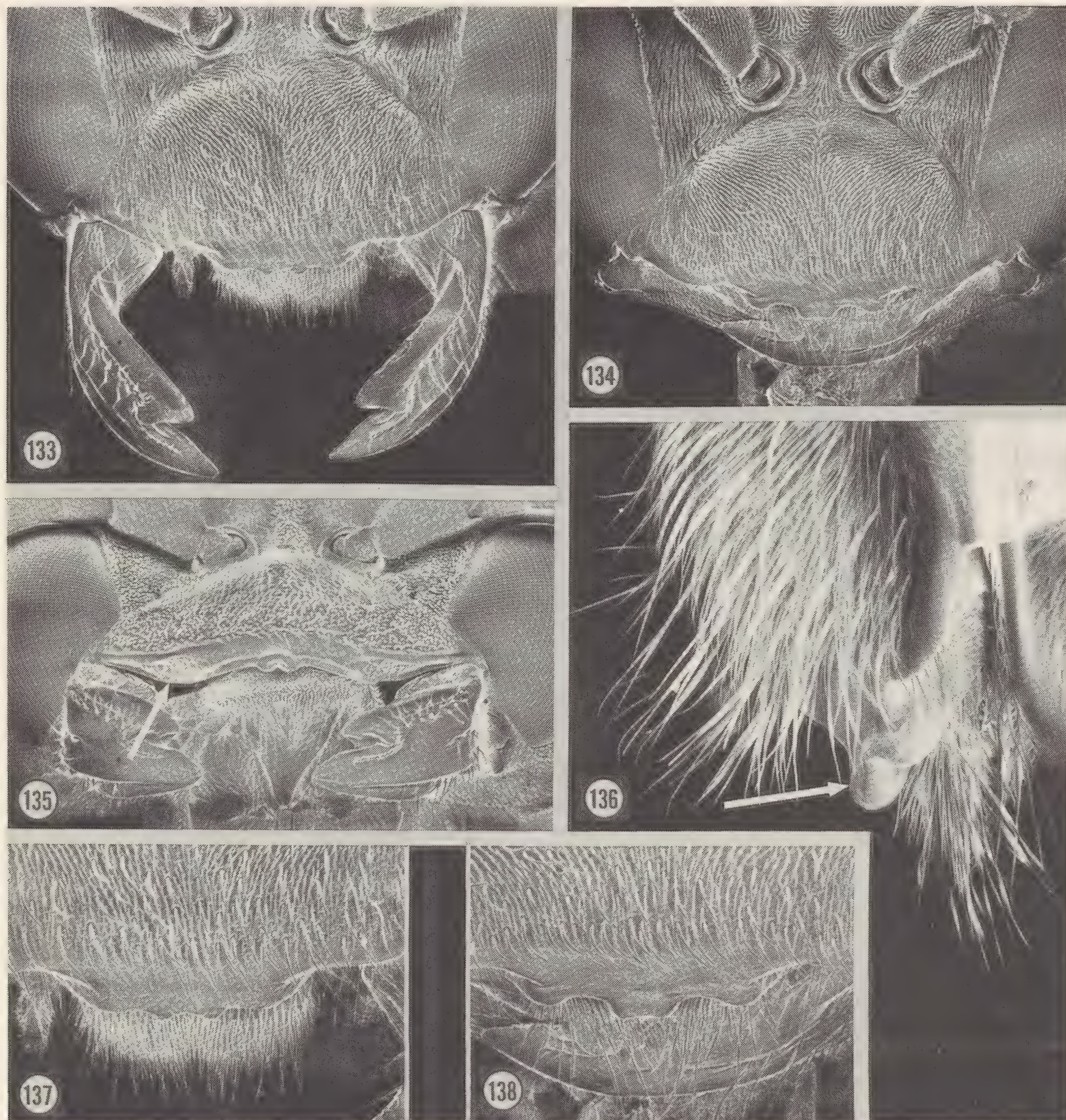
Figures 126-130. Euryops group, male structures. 126-127, antenna of euryps showing asymmetrically swollen flagellomeres and narrow, asetose zones, respectively. 128-130, genitalia of eu, 128 is lateral view, 129 is ventral view, 130 is dorsal view.





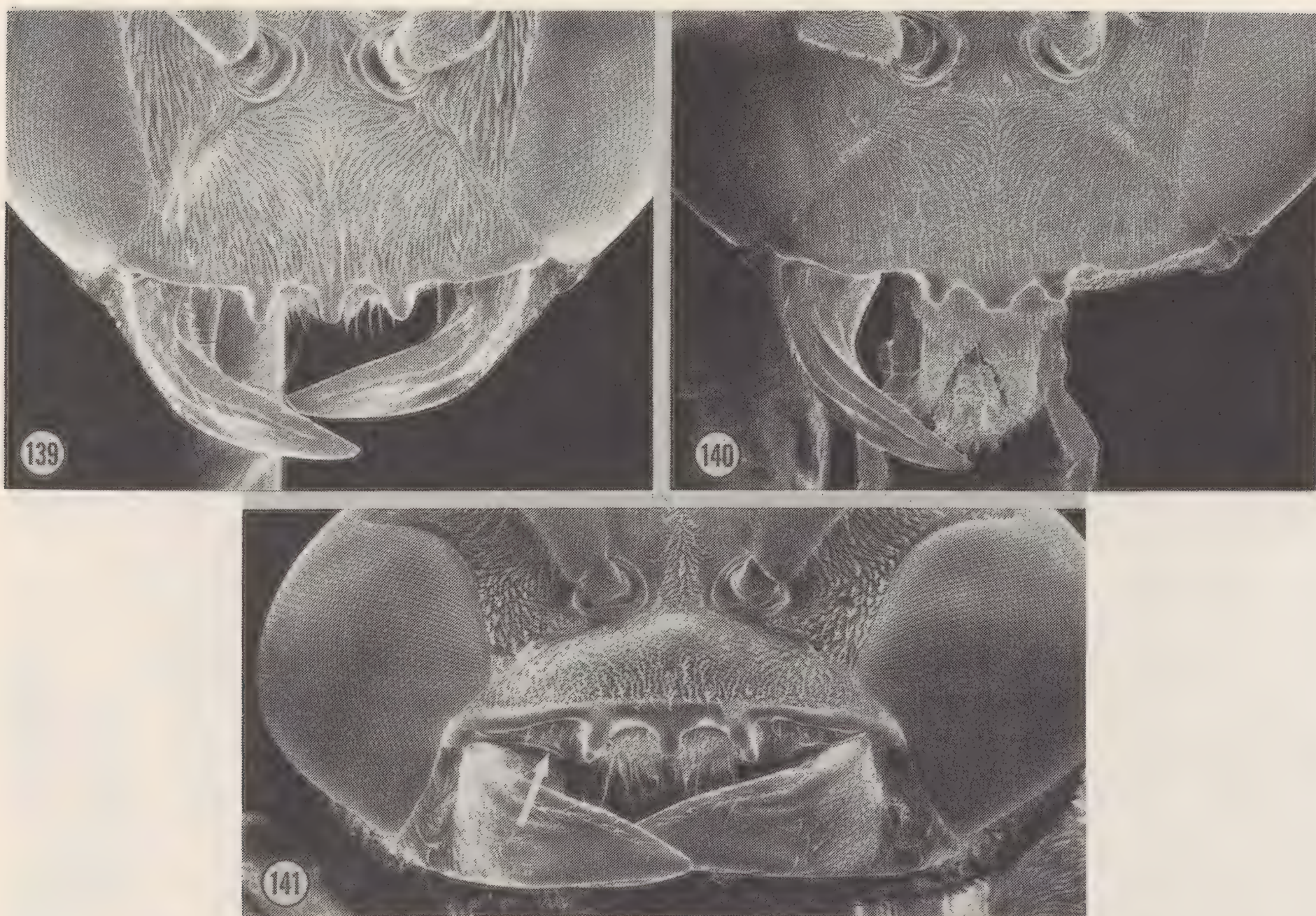
Figures 131-132. Cressoni group, forewings. 131, cressoni. 132, phthinilla.





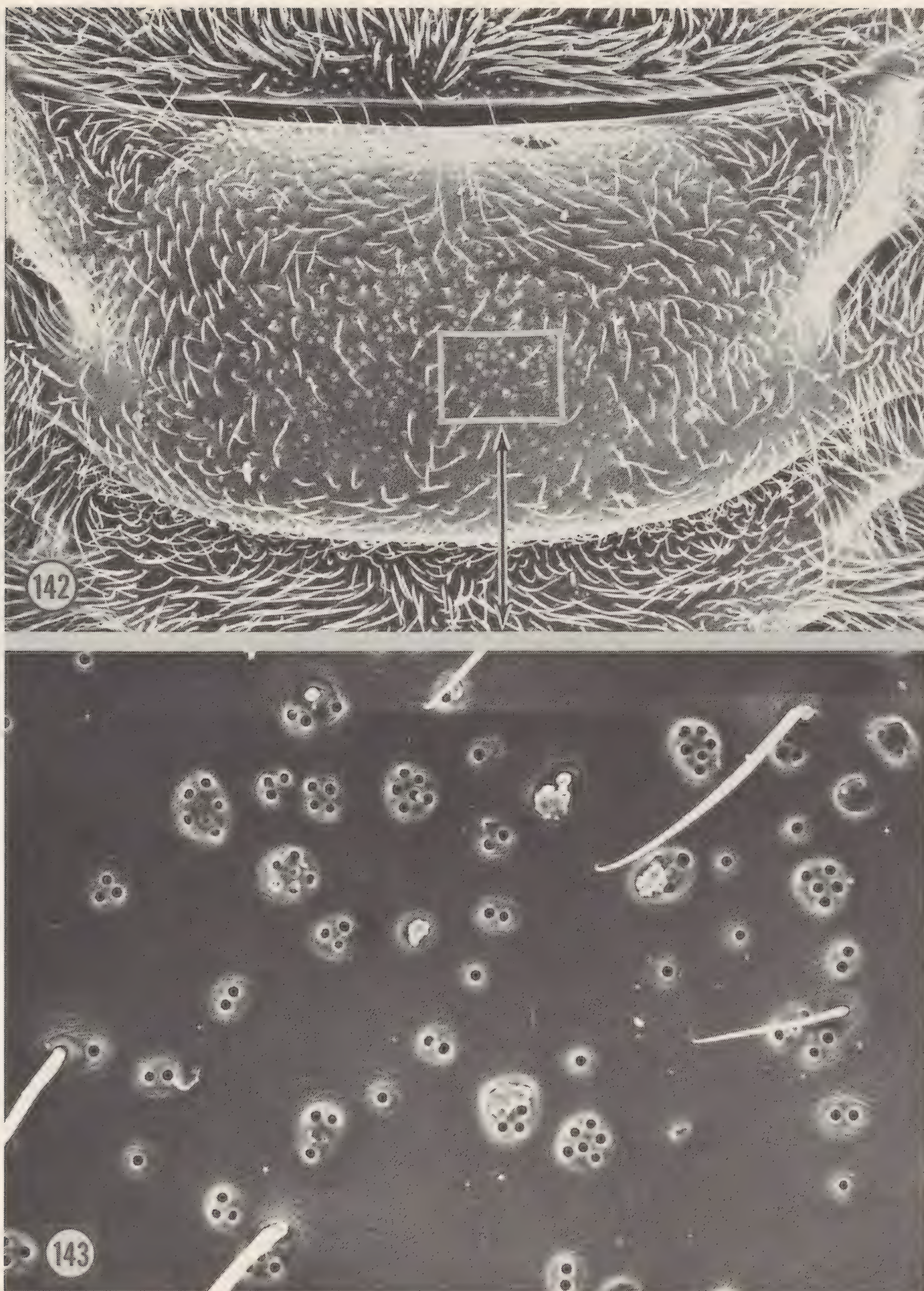
Figures 133-138. Pison cressoni, details of female clypeus and mandible. 133, specimen from Brasilia, Brasil. 134, specimen from Belize. 135, ventral view of clypeal margin, specimen from Brasilia (arrow indicates thickened lateral part of margin). 136, lateral closeup of reflexed clypeal edge (arrow) of specimen from Belize. 137-138, closeup of clypeal lobe of specimens from Brasilia and Belize, respectively.





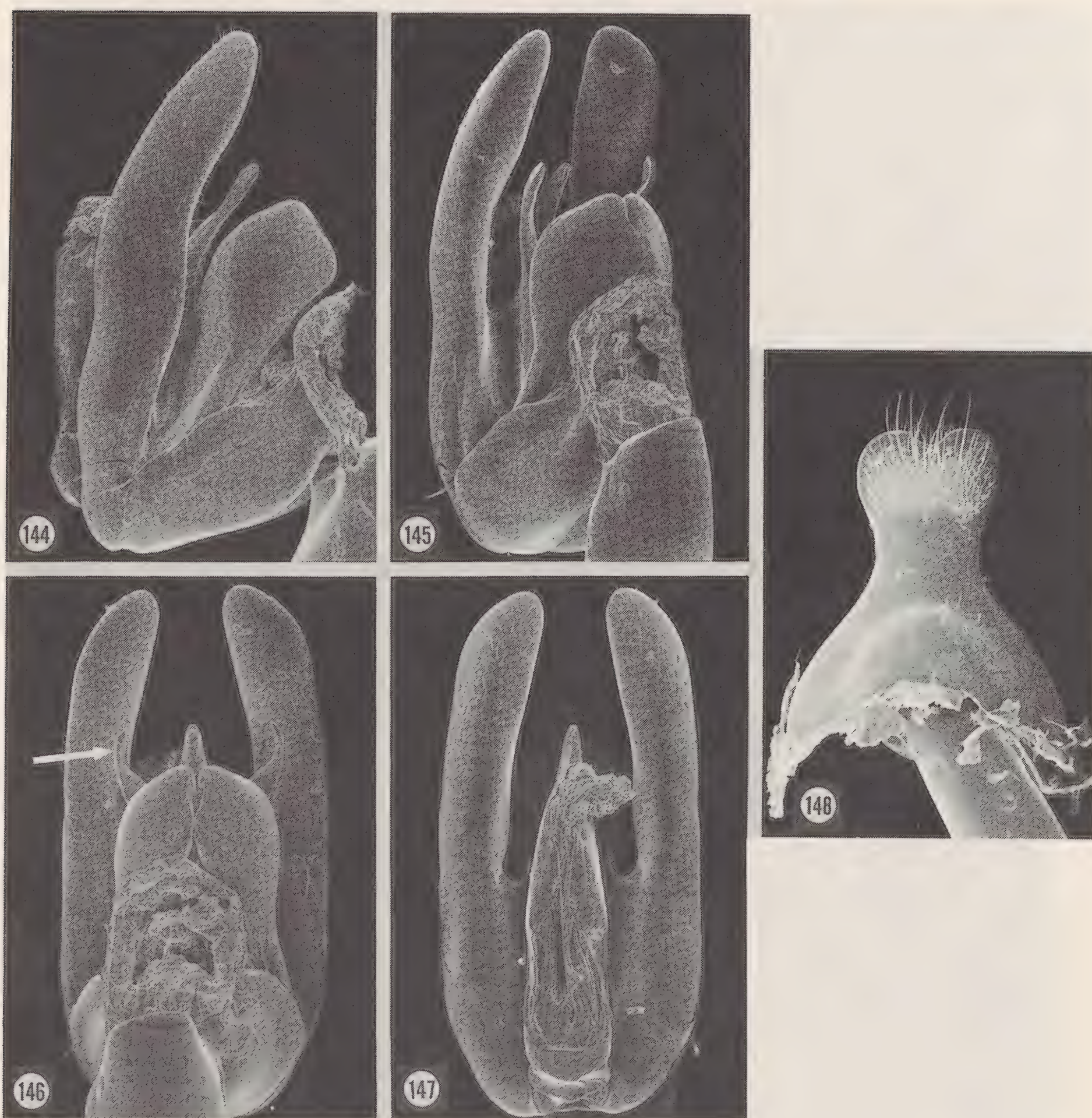
Figures 139-141. *Pison cressoni*, male clypeal details. 139-140, front view of specimens from Costa Rica and Belem, Brazil, respectively. 141, ventral view of clypeal margin of specimen from Costa Rica showing thickened lateral part (arrow).





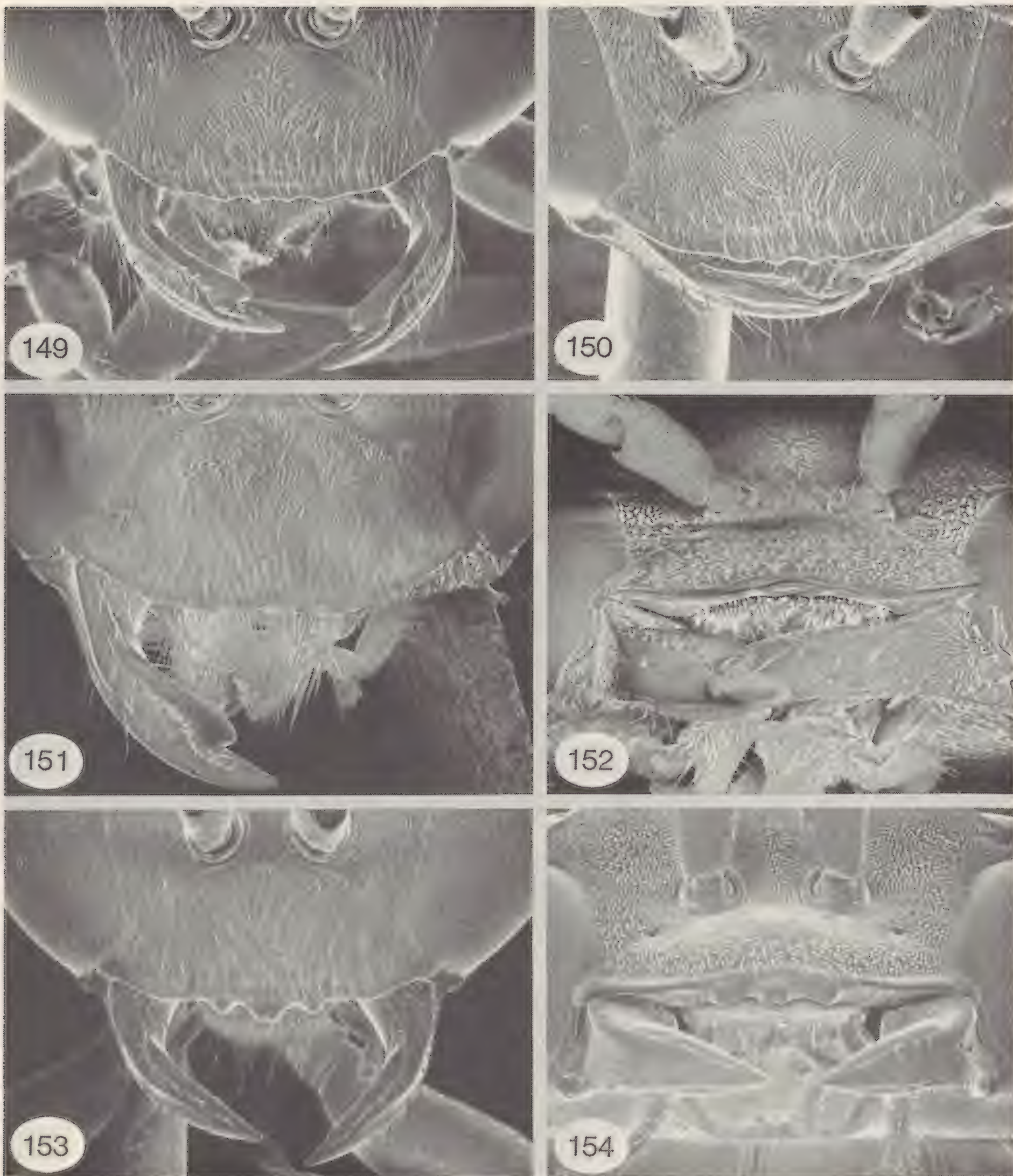
Figures 142-143. *Pison cressoni*, scutellum. 142, dorsal view showing bipunctate area on posterior half (area in rectangle enlarged in figure 143 to show nature of pores).





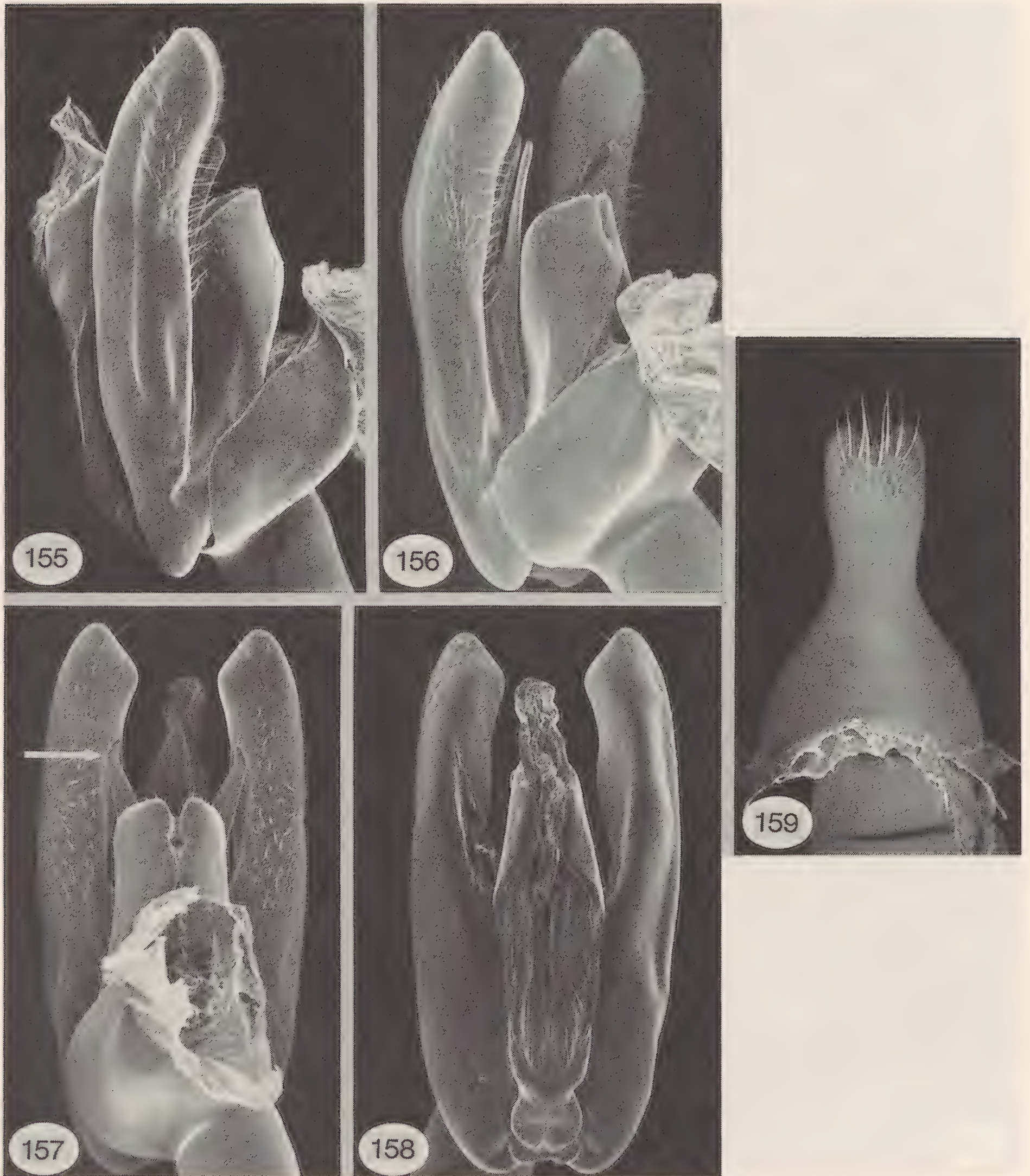
Figures 144-148. *Pison cressoni*, male structures. 144-147, genitalia, 144 is lateral view, 145 is three-quarter ventral view, 146 is ventral view (arrow indicates midventral lobe of gonostyle), 147 is dorsal view. 148, sternum VIII.





Figures 149-154. *Pison chrysops*, details of clypeus and mandible. 149-151, front view of female clypeus and mandible (149 is from Costa Rica, 150 is from Santa Catarina, Brasil, 151 is from Venezuela). 152, ventral view of Venezuelan female clypeus. 153-154, front and ventral views, respectively, of male clypeus and mandible.





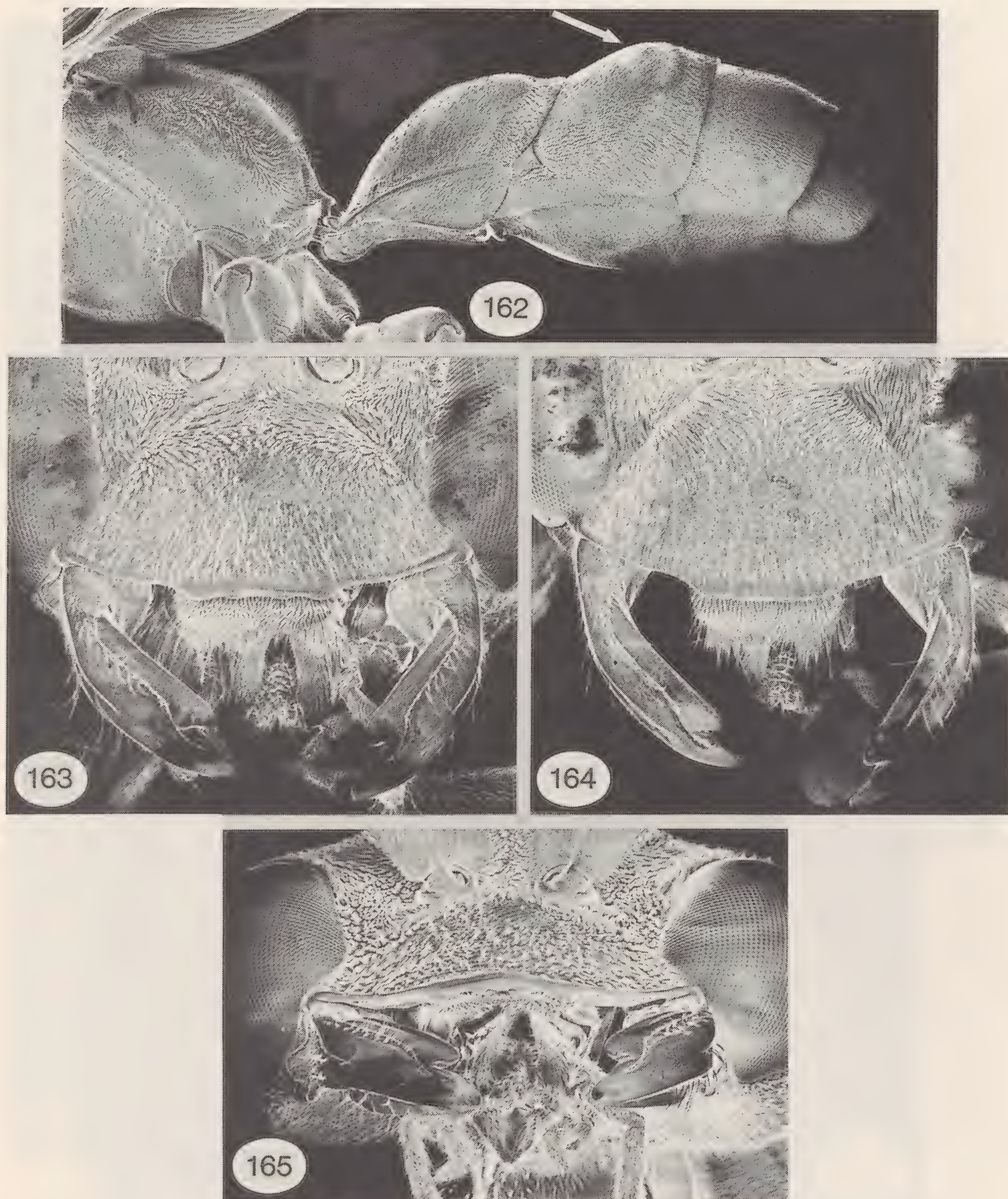
Figures 155-159. *Pison chrysops*, male structures. 155-158, genitalia; 155 is lateral view, 156 is three-quarter ventral view, 157 is ventral view (arrow indicates tip of gonostyle), 158 is dorsal view. 159, sternum VIII.





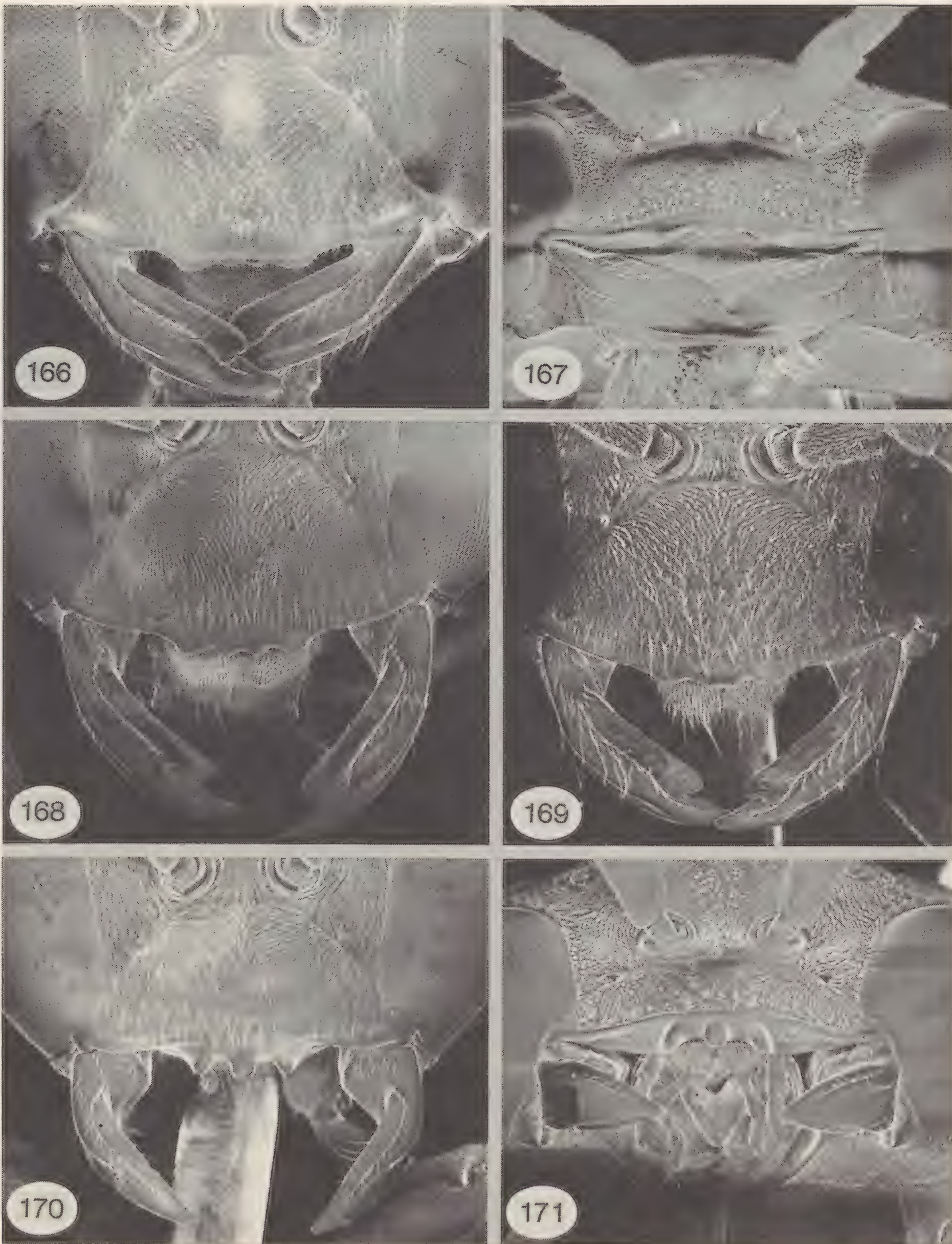
Figures 160–161. Pison erebus and pentafasciatum, respectively, front view of female clypeus and mandible (holotypes).





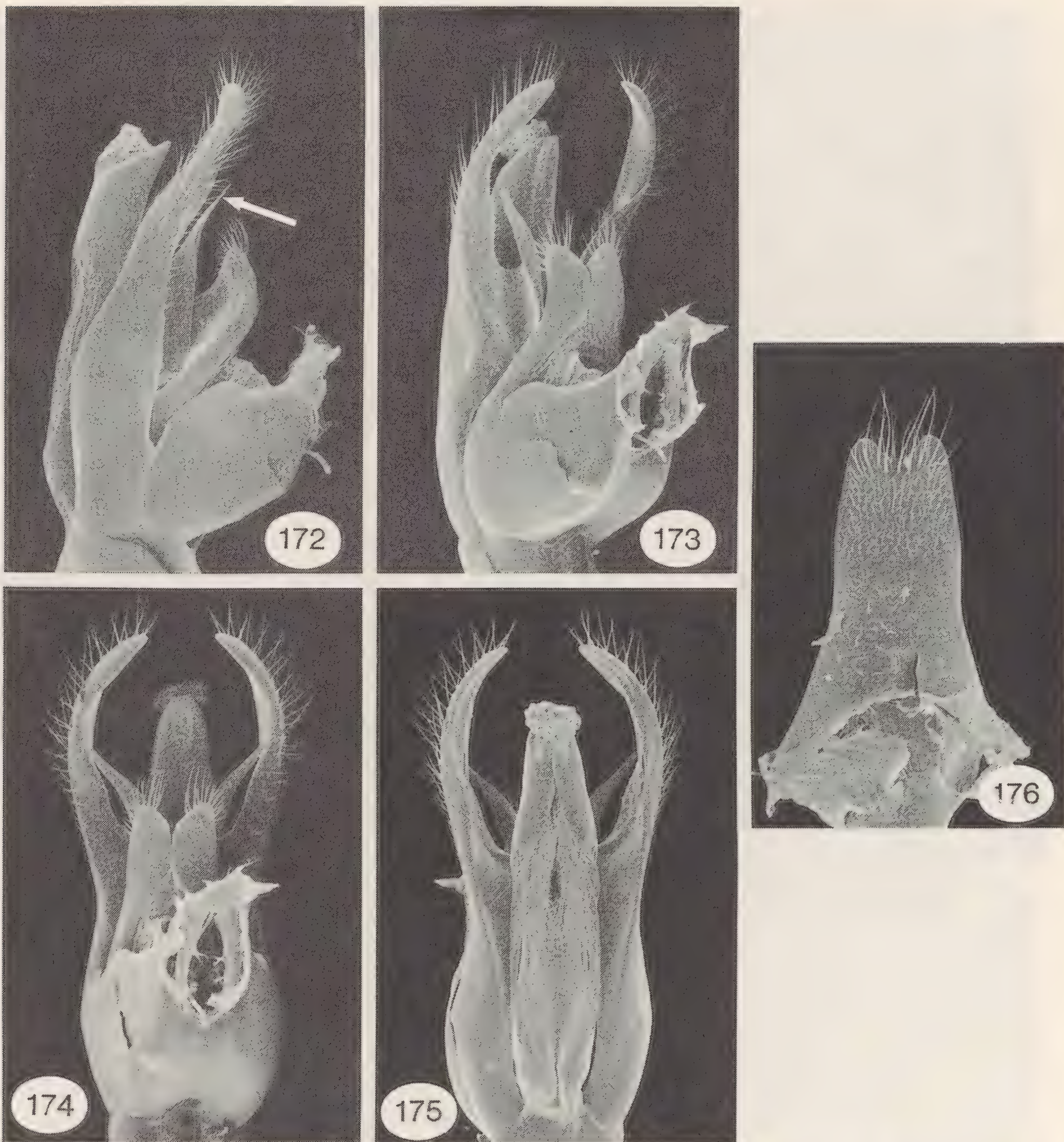
Figures 162-165. *Pison martini*, female details. 162, lateral view of propodeum and gaster (arrow points to humped tergum II). 163-164, front view of clypeus and mandible of same specimen from two different angles. 165, ventral view of clypeus shown in 163-164.





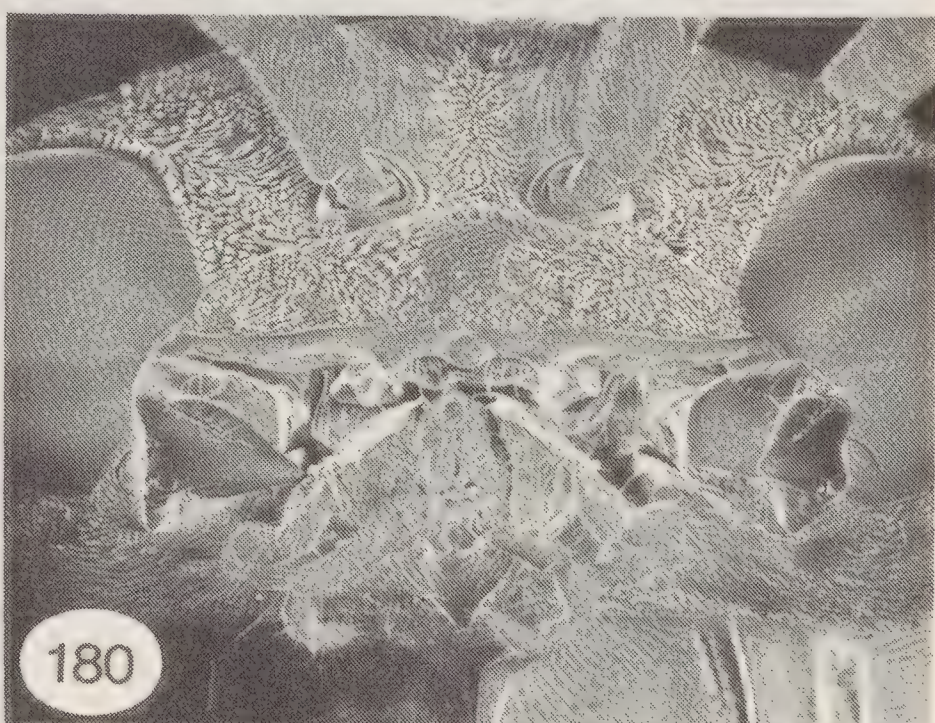
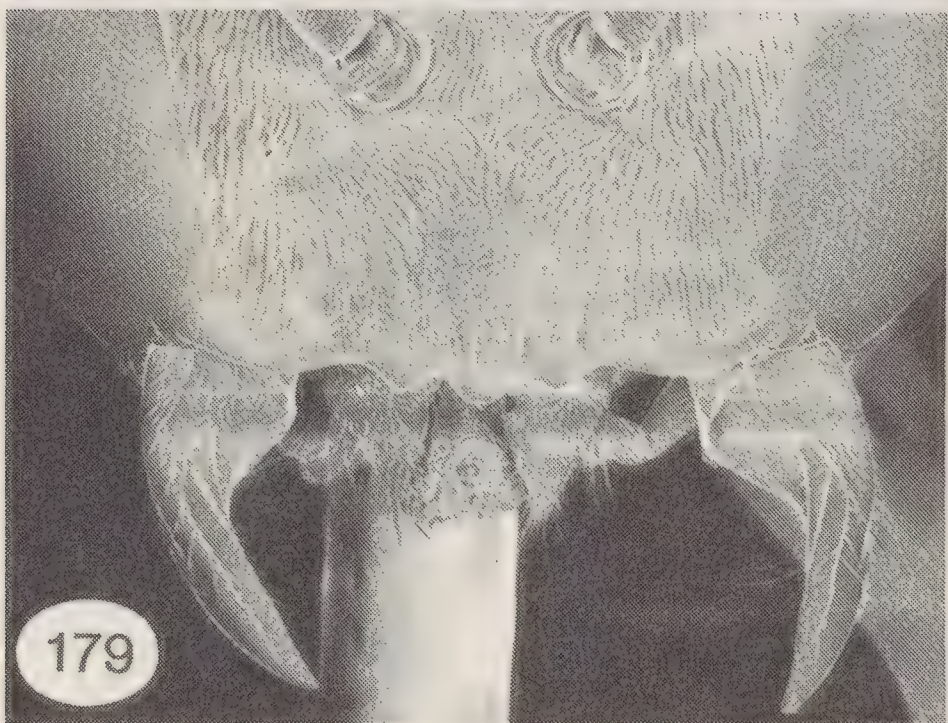
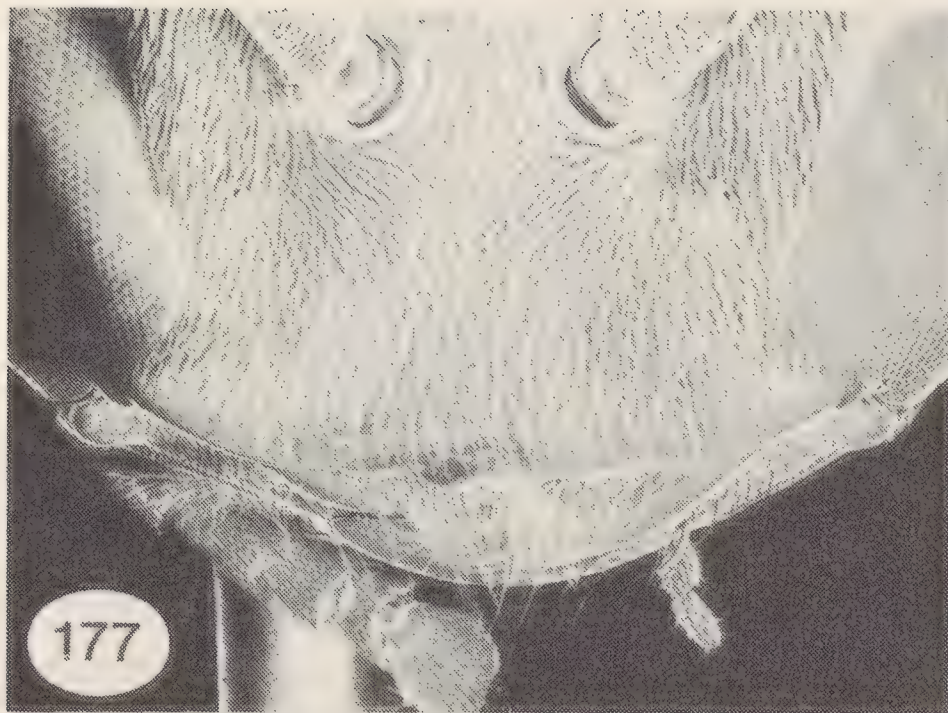
Figures 166-171. *Pison maculipenne*, details of clypeus and mandible. 166-167, front and ventral views, respectively, of female from Villa Garzon, Colombia. 168-169, front views of females from Barbacoas, Colombia and Rio de Janeiro, Brasil, respectively. 170-171, front and ventral views, respectively, of male.





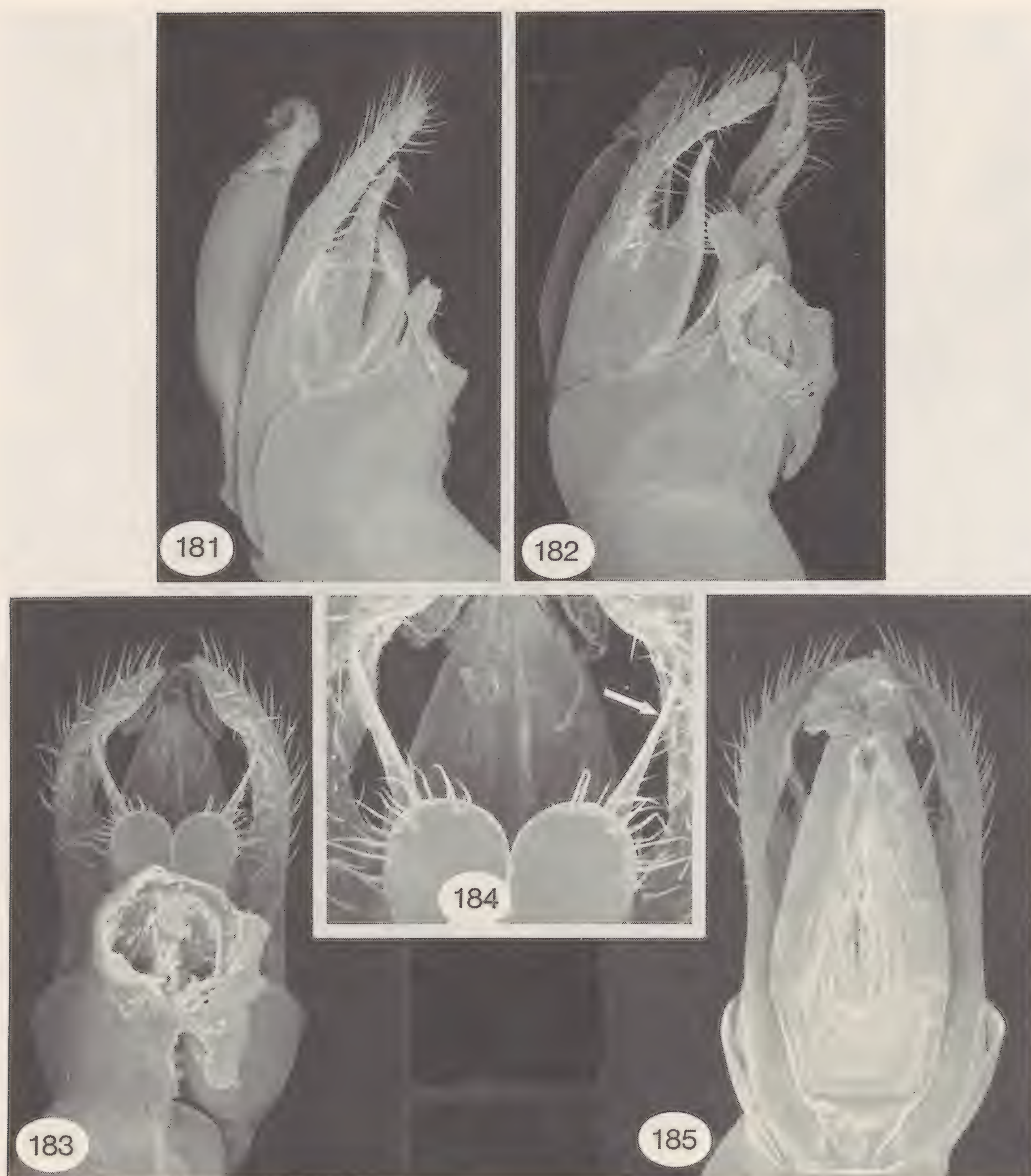
Figures 172-176. *Pison maculipenne*, male details. 172-175, genitalia; 172 is lateral view (arrow indicates apex of midventral lobe of gonostyle), 173 is three-quarter ventral view, 174 is ventral view, 175 is dorsal view. 176, sternum VIII.





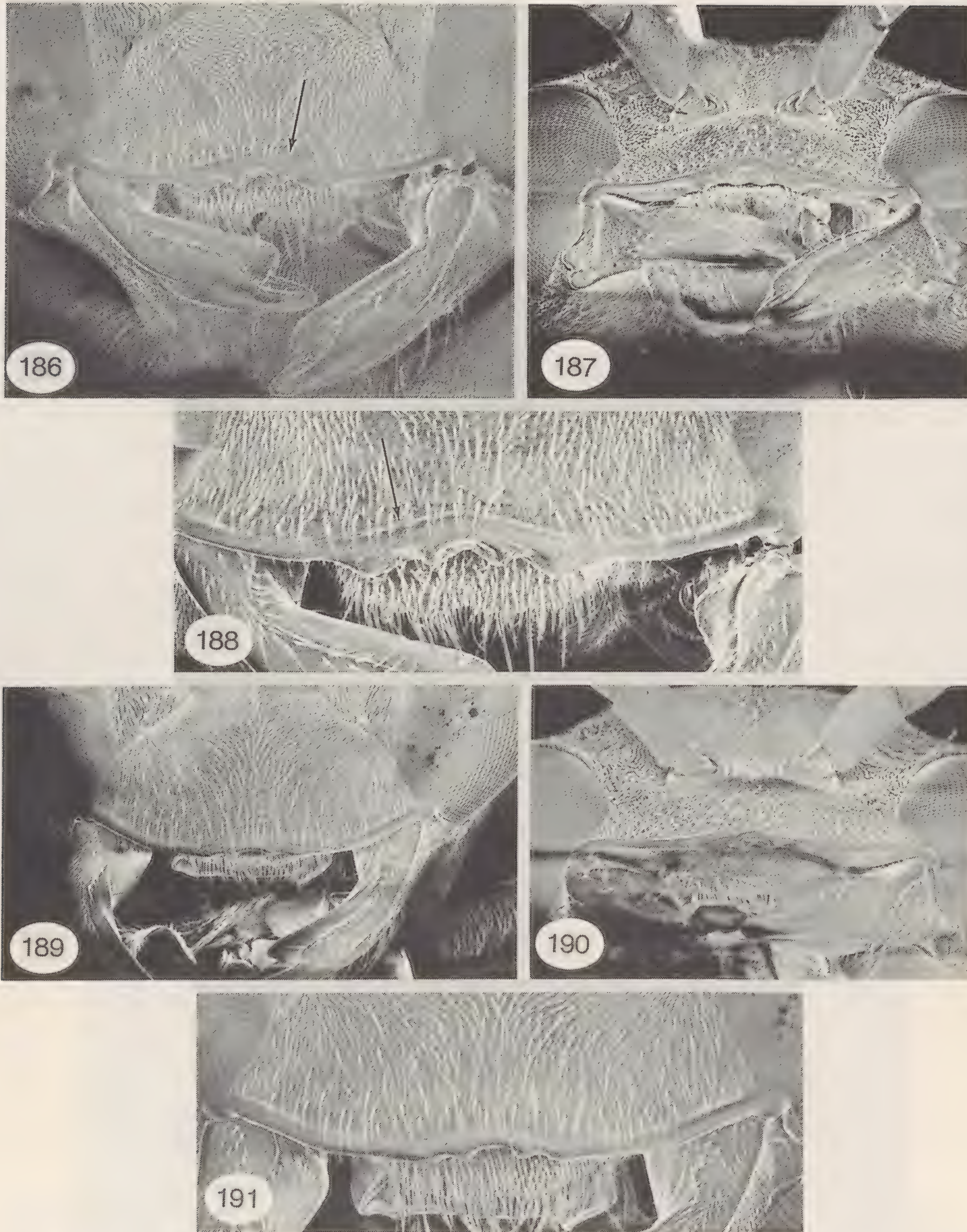
Figures 177-180. *Pison brasilius*, details of clypeus and mandible. 177-178, front and ventral views, respectively, of female. 179-180, front and ventral views, respectively, of male.





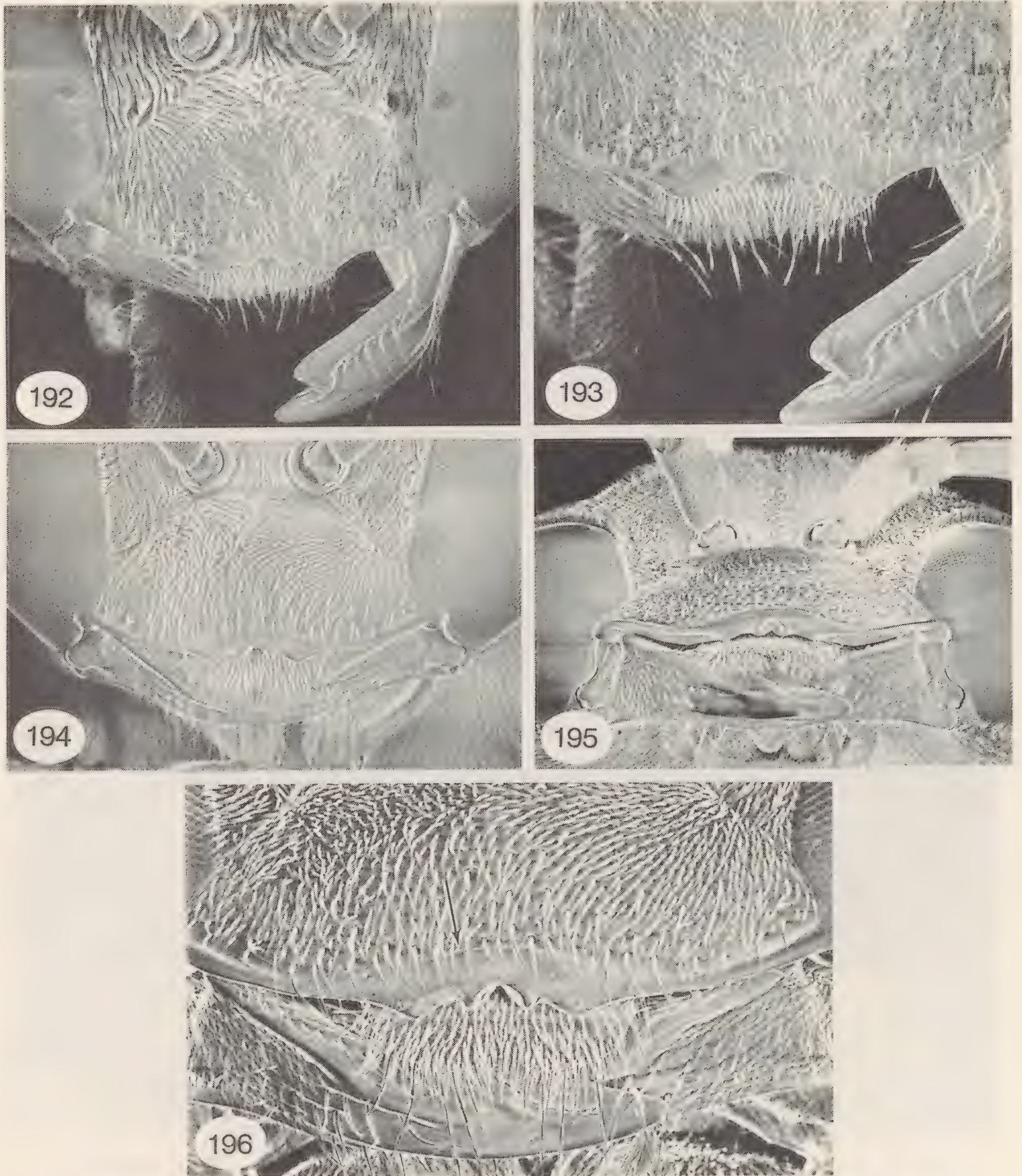
Figures 181-185. *Pison brasiliun*, male genitalia. 181 is lateral view, 182 is three-quarter ventral view, 183 is ventral view, 184 is detail view of venter with arrow indicating apex of midventral lobe, 185 is dorsal view.





Figures 186-191. Pison arachniraptor, details of female clypeus and mandible. 186-187, front and ventral views, respectively, of specimen from Guyana (arrow indicates elevated clypeal rim). 188, closeup of clypeal margin of specimen from Guyana (arrow indicates elevated rim). 189-190, front and ventral views, respectively, of specimen from Villa Garzon, Colombia (metatype). 191, closeup of clypeal margin of specimen from Colombia (metatype).





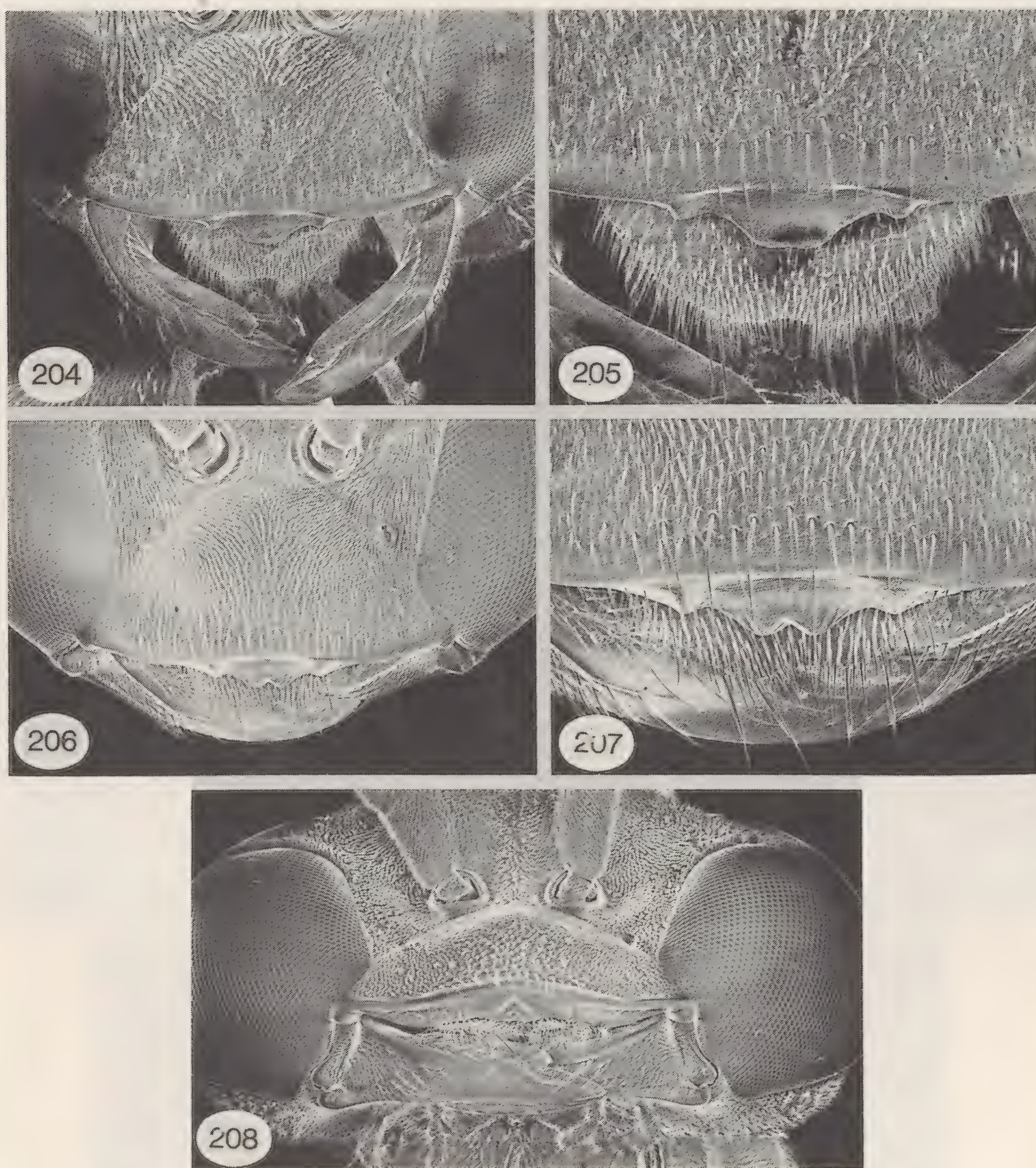
Figures 192-196. *Pison arachniraptor*, details of female clypeus and mandible. 192-193, front views of specimen from Cumbaratza, Ecuador (metatype). 194-195, front and ventral views, respectively, of specimen from Itabuna, Brasil (metatype). 196, closeup view of clypeal margin of specimen from Itabuna, Brasil (arrow indicates elevated clypeal rim).





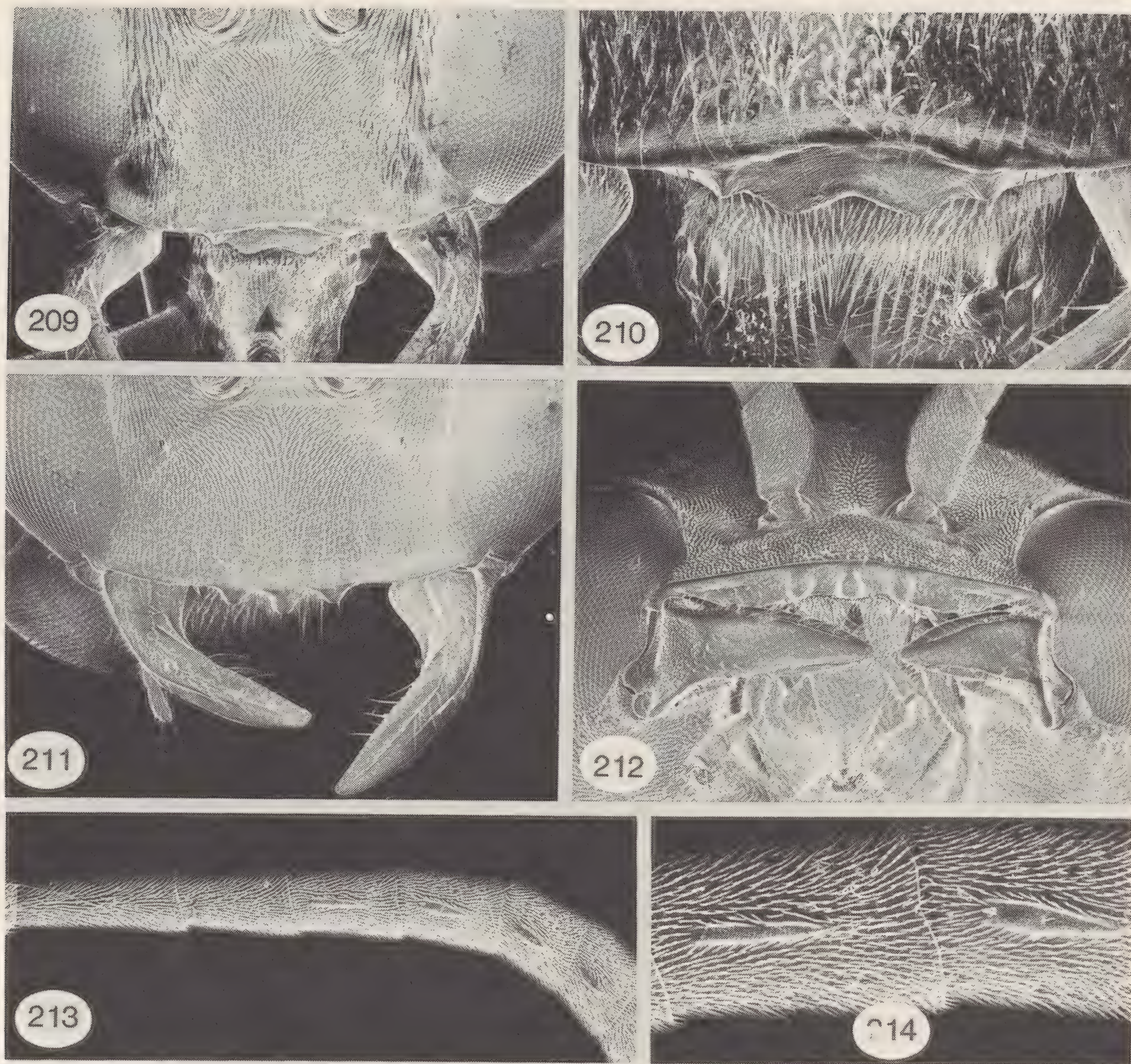
Figures 197-203. *Pison arachniraptor*, male details. 197-198, front and ventral views, respectively, of clypeus and mandible. 199-203, genitalia; 199 is lateral view, 200 is three-quarter ventral view, 201 is ventral view, 202-203 are closeups of apex of midventral lobe of gonostyle (arrow).





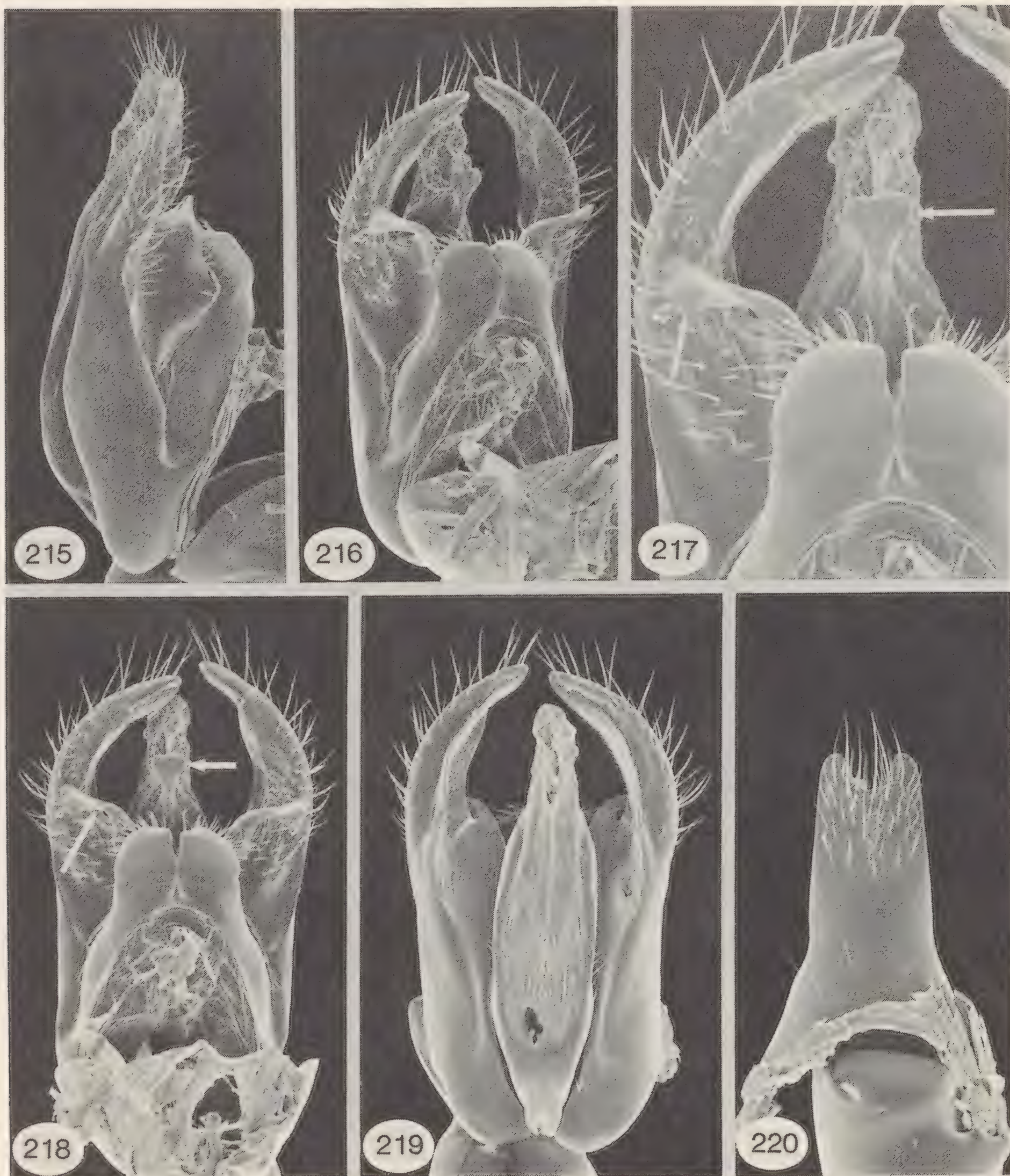
Figures 204-208. *Pison cameronii*, details of female clypeus and mandible. 204-205, front view of entire clypeus and detail of clypeal margin, respectively, of specimen from Ecuador. 206-207, front view of entire clypeus and detail of clypeal margin, respectively, of specimen from Canal Zone. 208, ventral view of clypeus, specimen from Canal Zone.





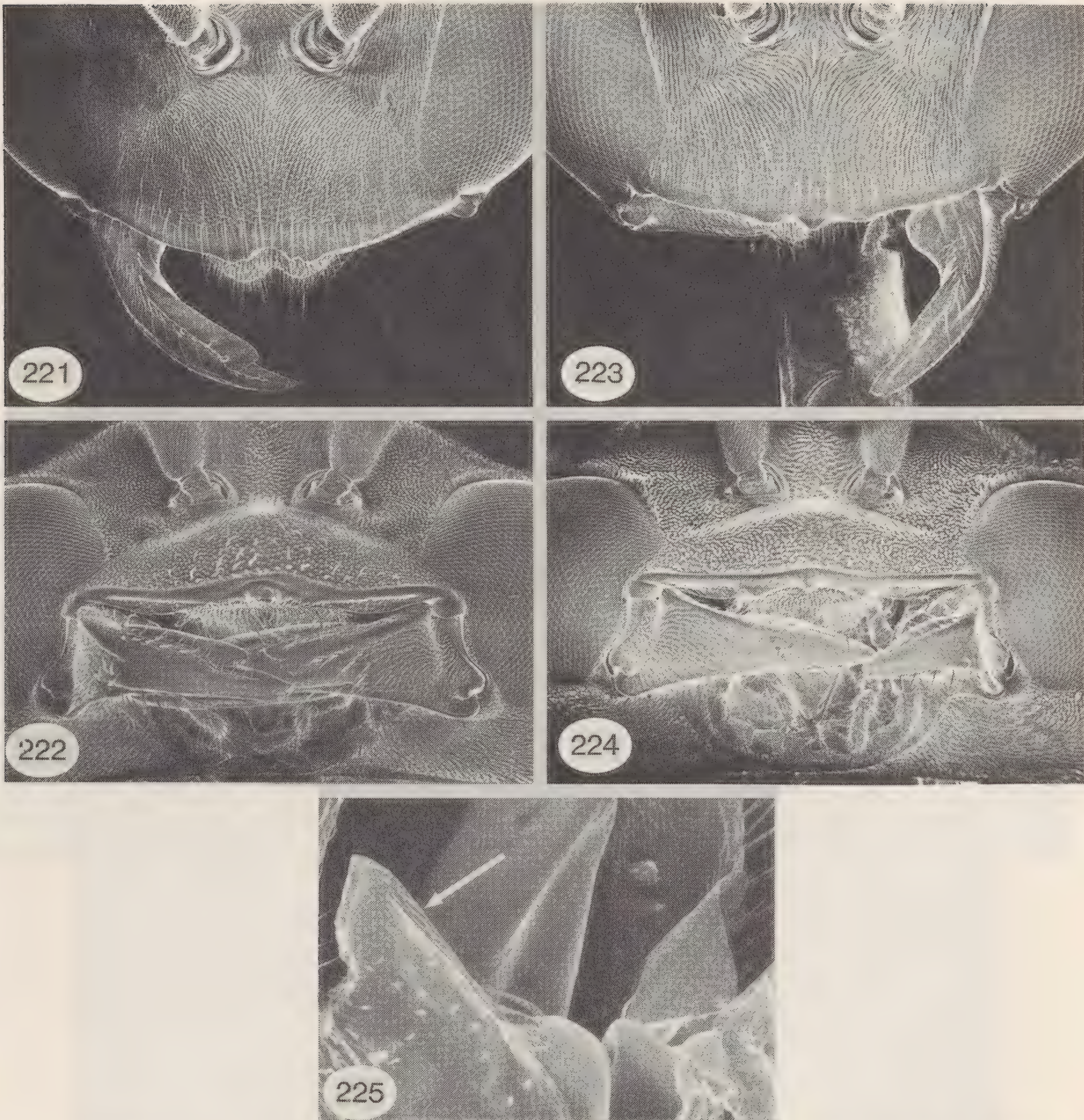
Figures 209-214. Pison cameronii. 209-210, front view of female clypeus and detail of clypeal margin, respectively, of specimen from Colombia. 211-212, front and ventral views, respectively, of male clypeus and mandible. 213, flagellomeres I-VI of male showing tyli on III-VI. 214, closeup of male flagellomeres III-IV showing tyli.





Figures 215-220. *Pison cameronii*, male details. 215-219, genitalia; 215 is lateral view, 216 is three-quarter ventral view, 217 is closeup of venter (arrows indicate aedeagus and apex of midventral lobe of gonostyle), 218 is ventral view, 219 is dorsal view. 220, sternum VIII.





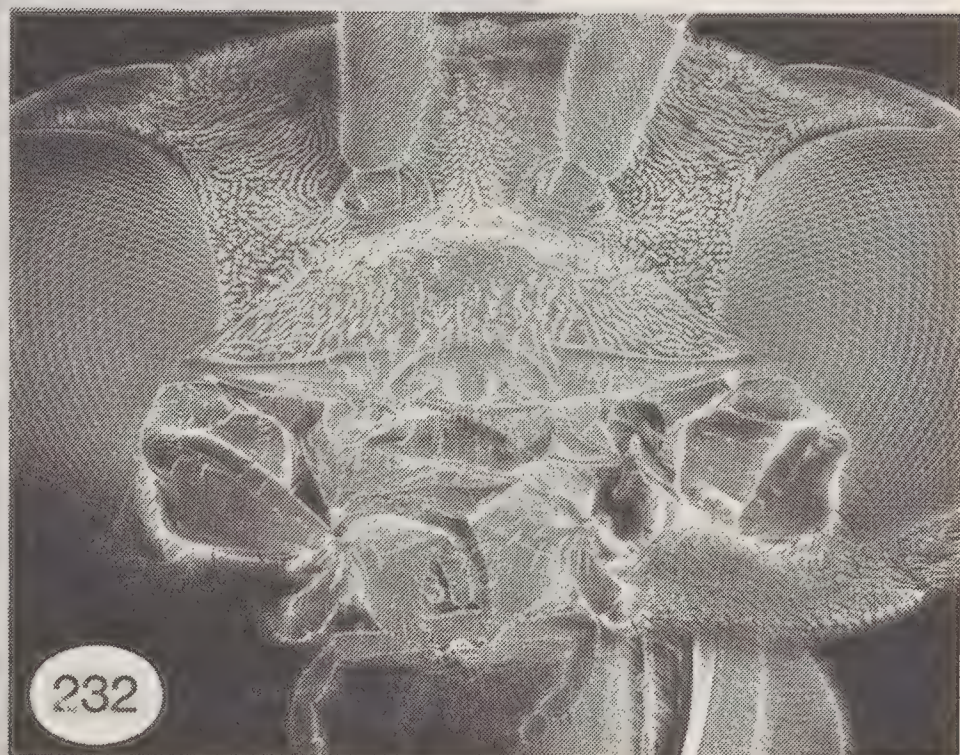
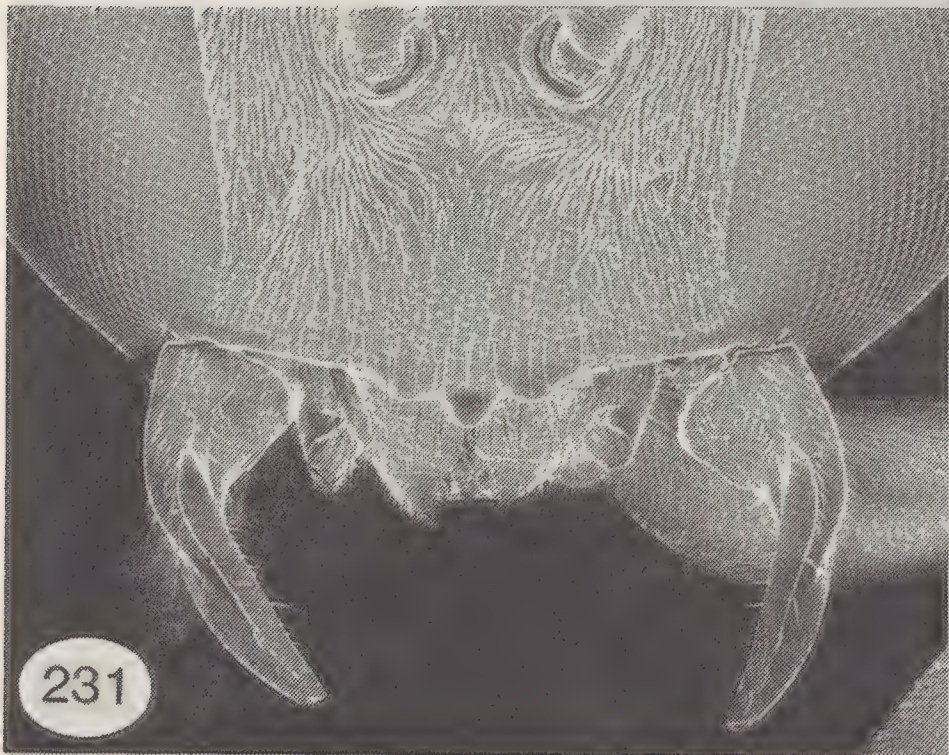
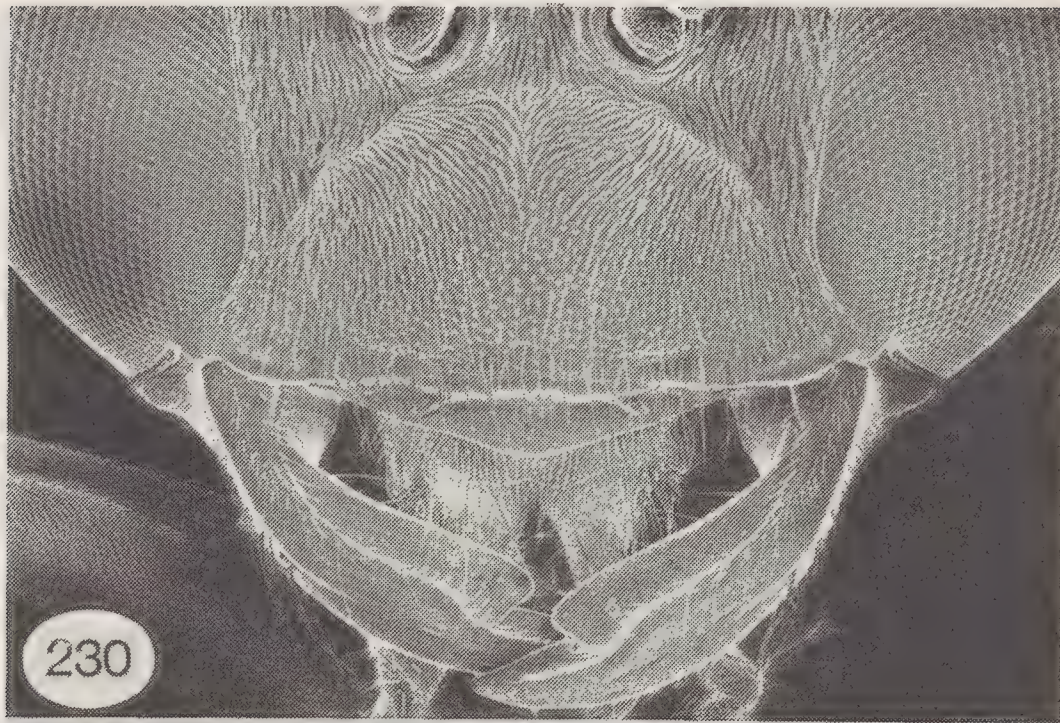
Figures 221-225. Pison dementia. 221-222, front and ventral views, respectively, of female clypeus and mandible. 223-224, front and ventral views, respectively, of male clypeus and mandible. 225, closeup three-quarter ventral view of male genitalia showing apex of midventral lobe of gonostyle (arrow).





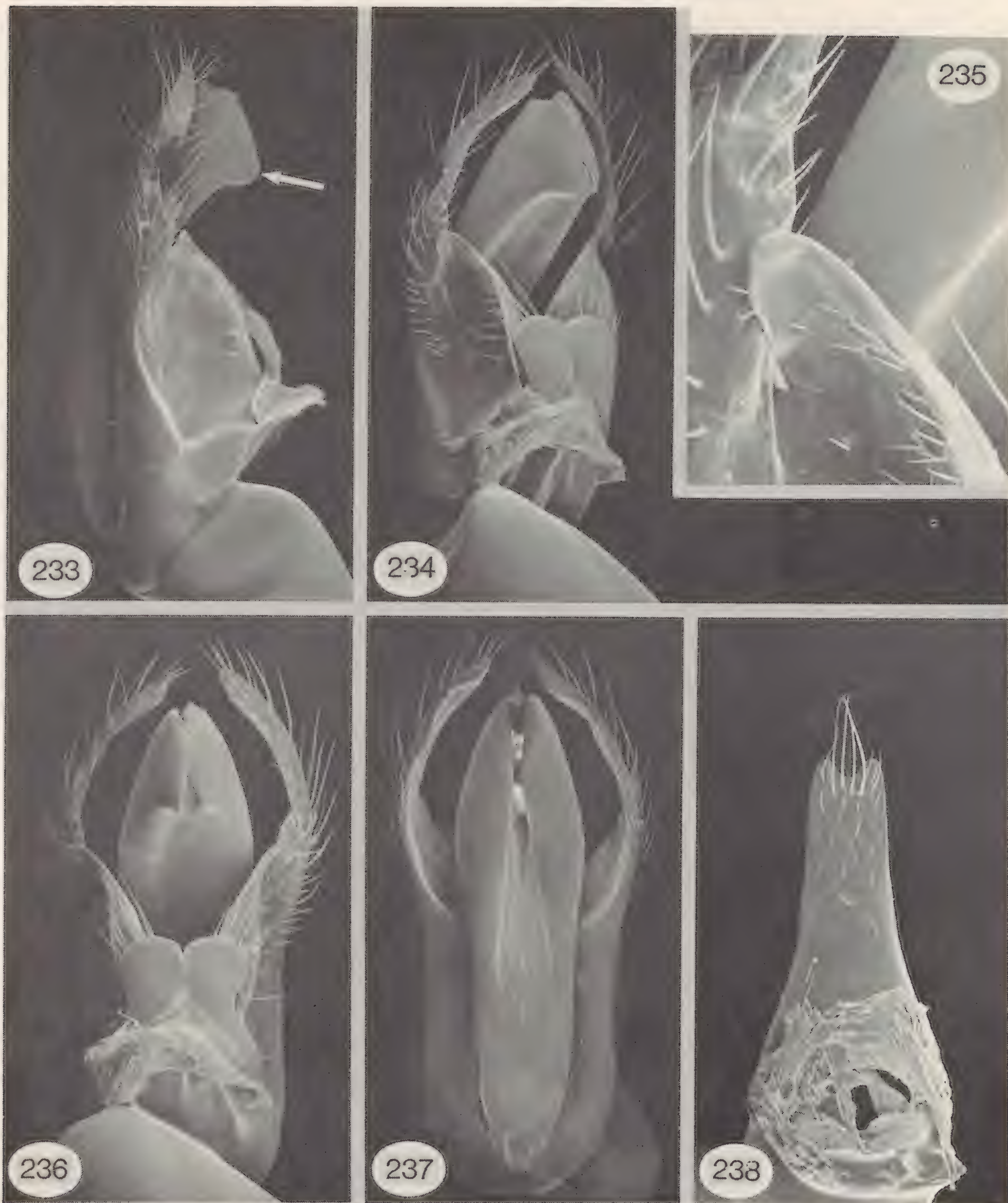
Figures 226-229. *Pison dementia*, male genitalia. 226 is lateral view, 227 is three-quarter ventral view (arrow indicates apex of midventral lobe of gonostyle), 228 is ventral view, 229 is dorsal view.





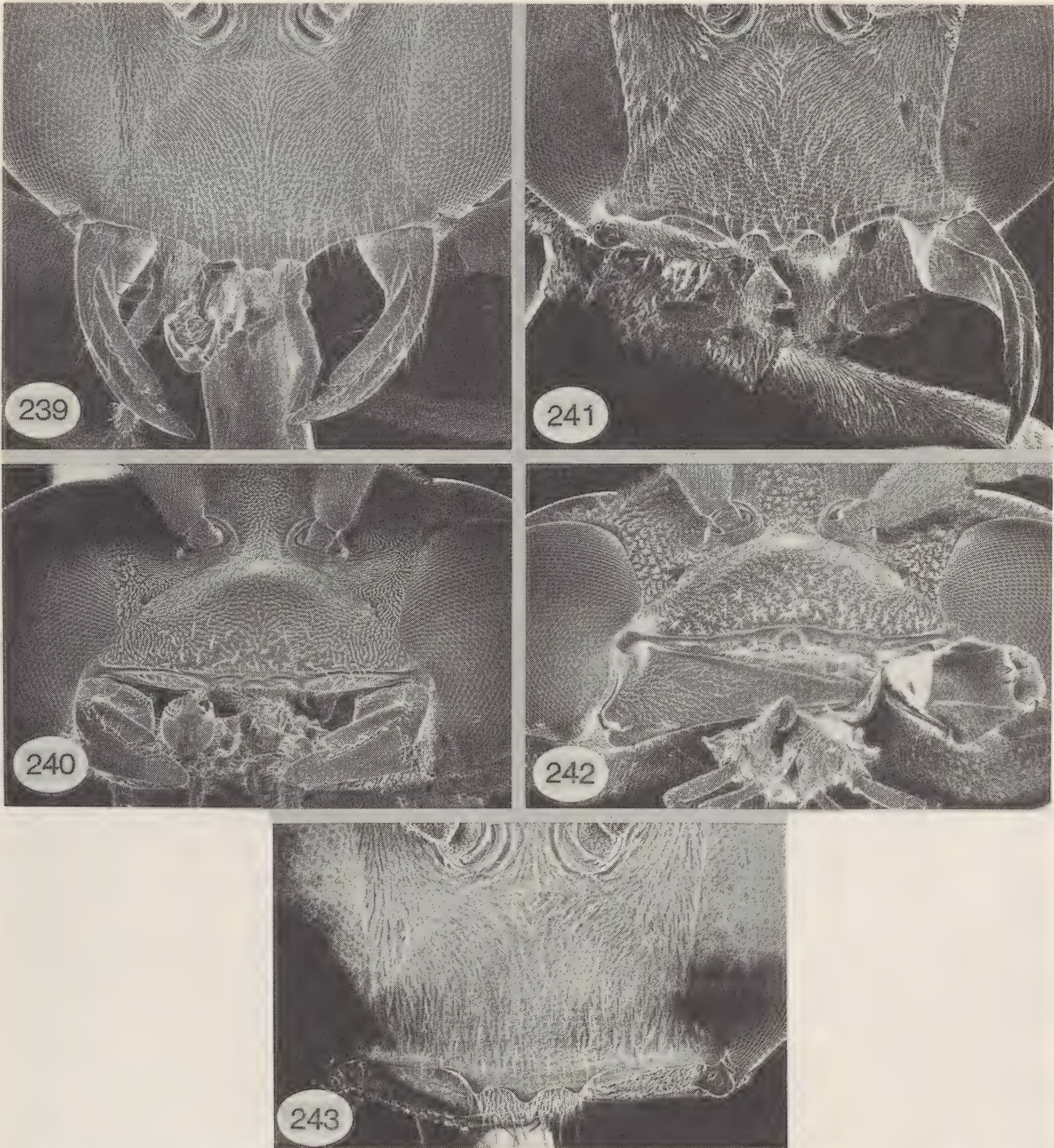
Figures 230-232. *Pison abothrum*, details of clypeus and mandible. 230, front view of female holotype. 231-232, front and ventral views, respectively, of male.





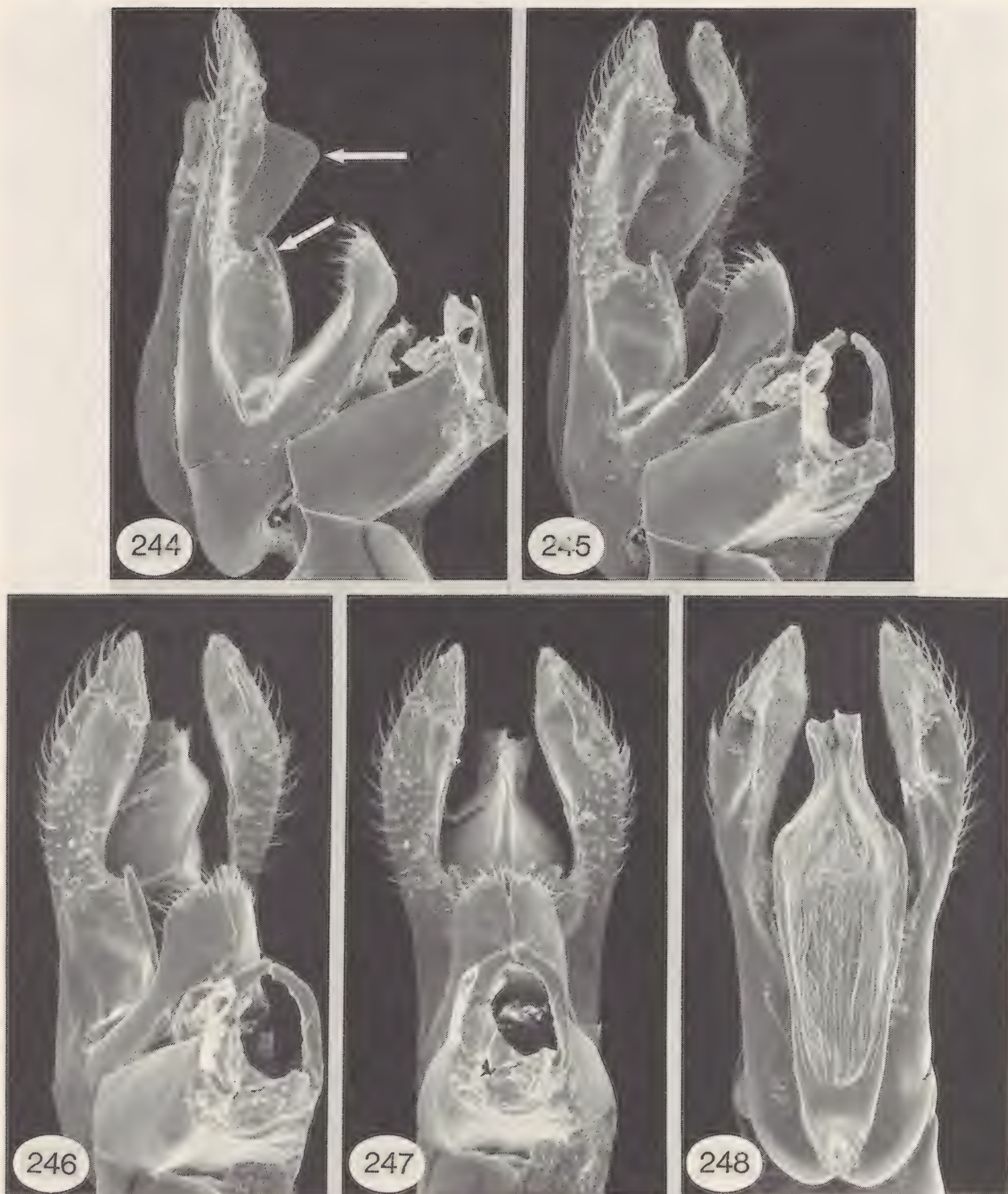
Figures 233-238. *Pison abothrum*, male details. 233-237, genitalia; 233 is lateral view (arrow indicates apex of aedeagus), 234 is three-quarter ventral view, 235 is three-quarter closeup view of venter showing apex of midventral lobe of gonostyle, 236 is ventral view, 237 is dorsal view. 238, sternum VIII.





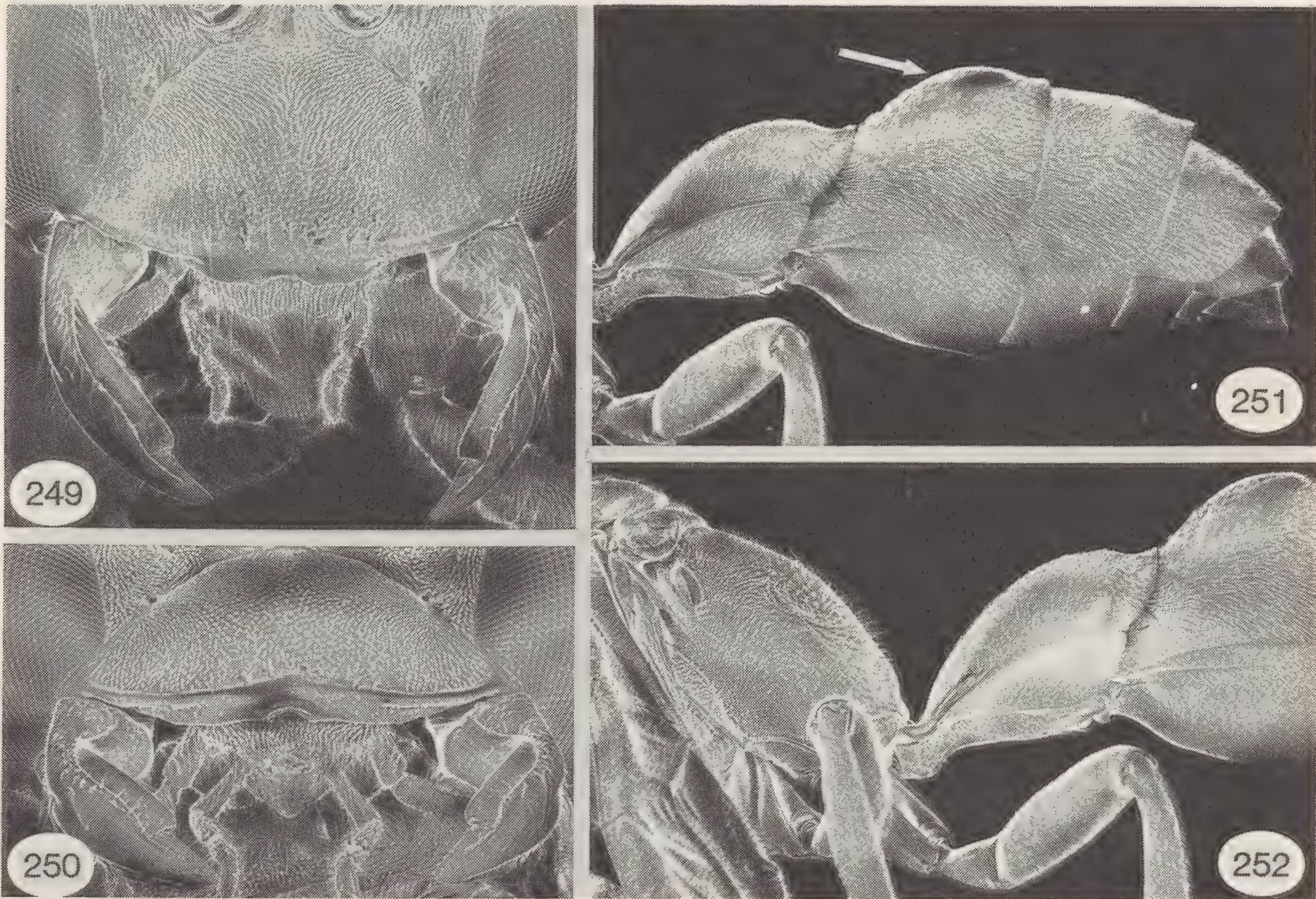
Figures 239-243. *Pison aranevorax*, details of clypeus and mandible. 239-240, front and ventral views, respectively, of female holotype. 241-242, front and ventral views, respectively, of female from Peru. 243, front view of male (Barbacoas, Colombia).





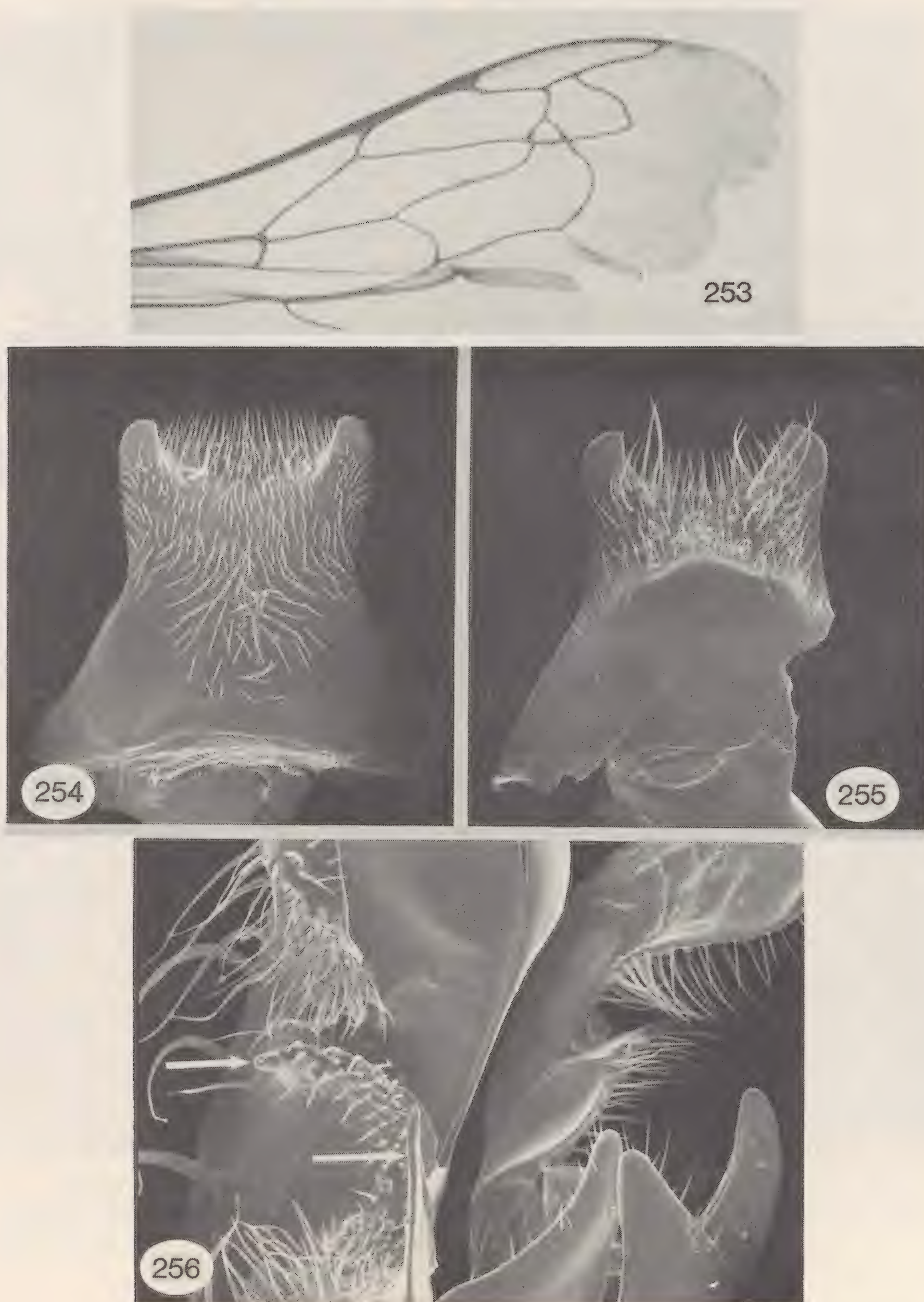
Figures 244-248. *Pison aranevorax*, male genitalia. 244, lateral view (arrow indicates apex of aedeagus), 245-246, three-quarter ventral views, 247, ventral view, 248, dorsal view.





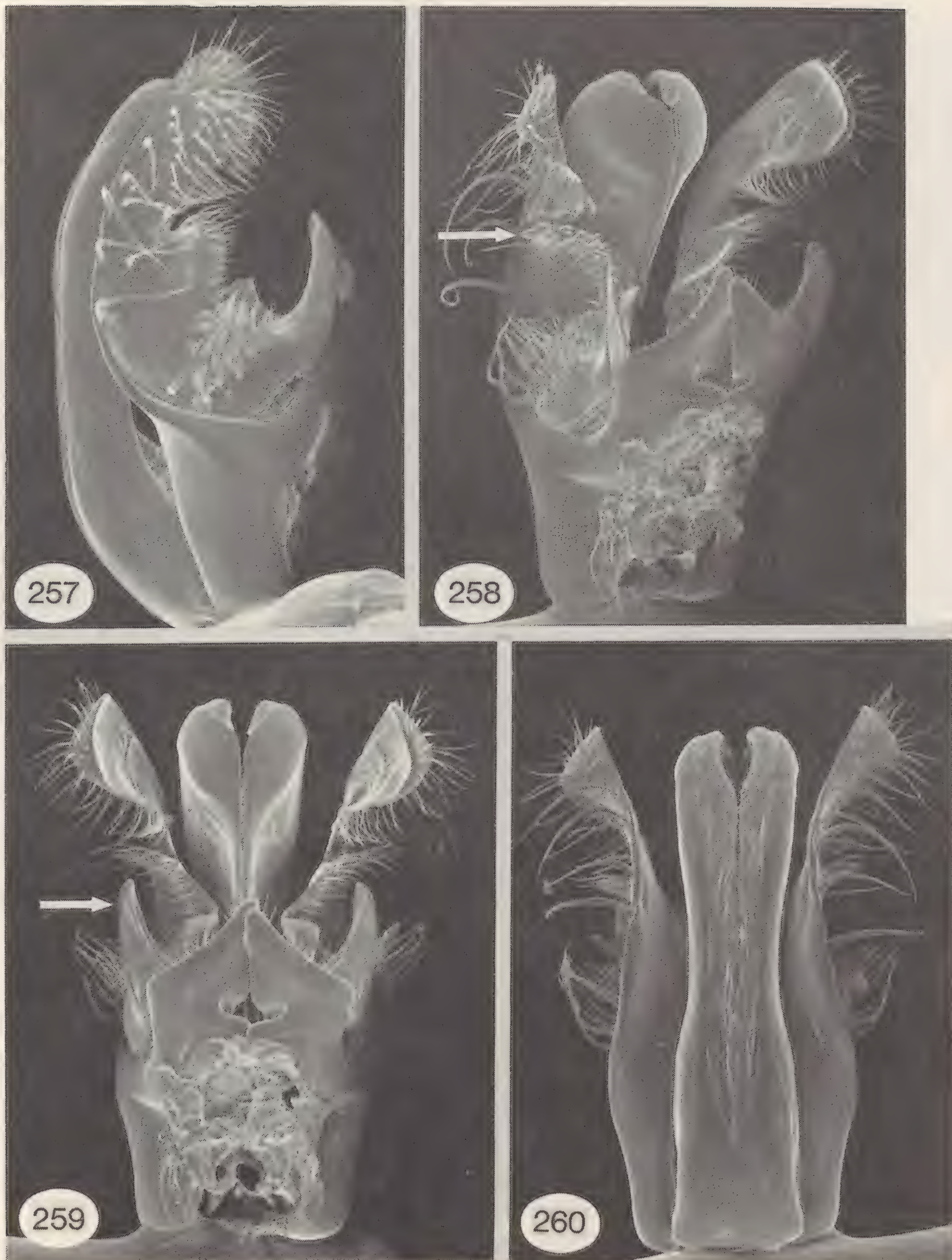
Figures 249-252. *Pison phthinylla*, female details. 249-250, front and ventral views, respectively, of clypeus and mandible. 251, lateral view of gaster, arrow points to tergum II. 252, lateral view of propodeum and first two segments of gaster.





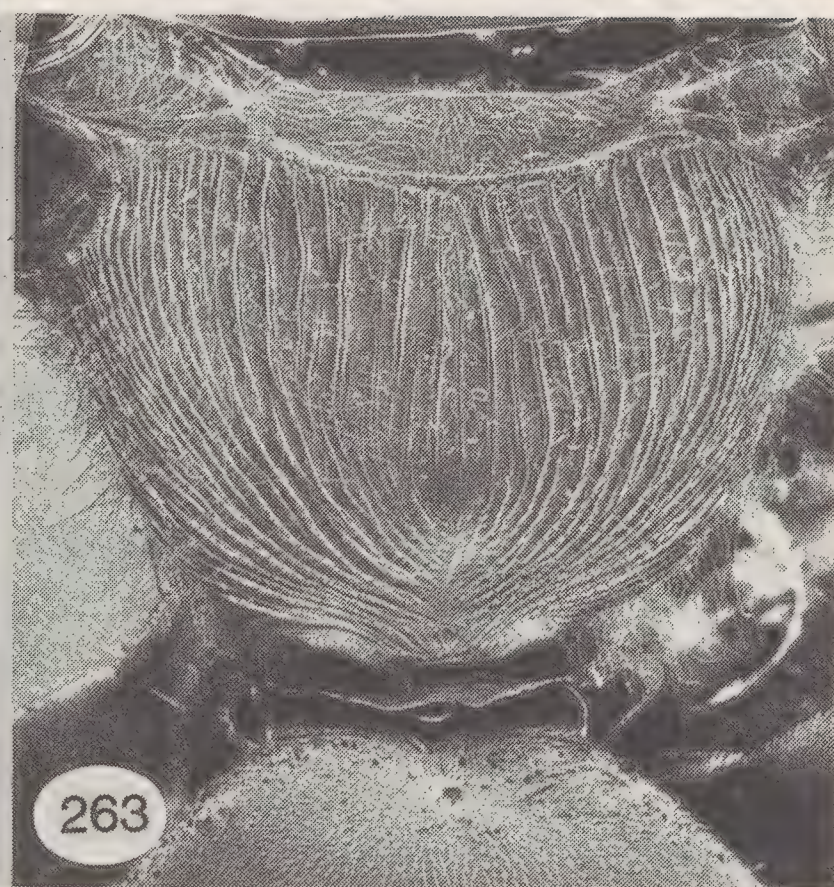
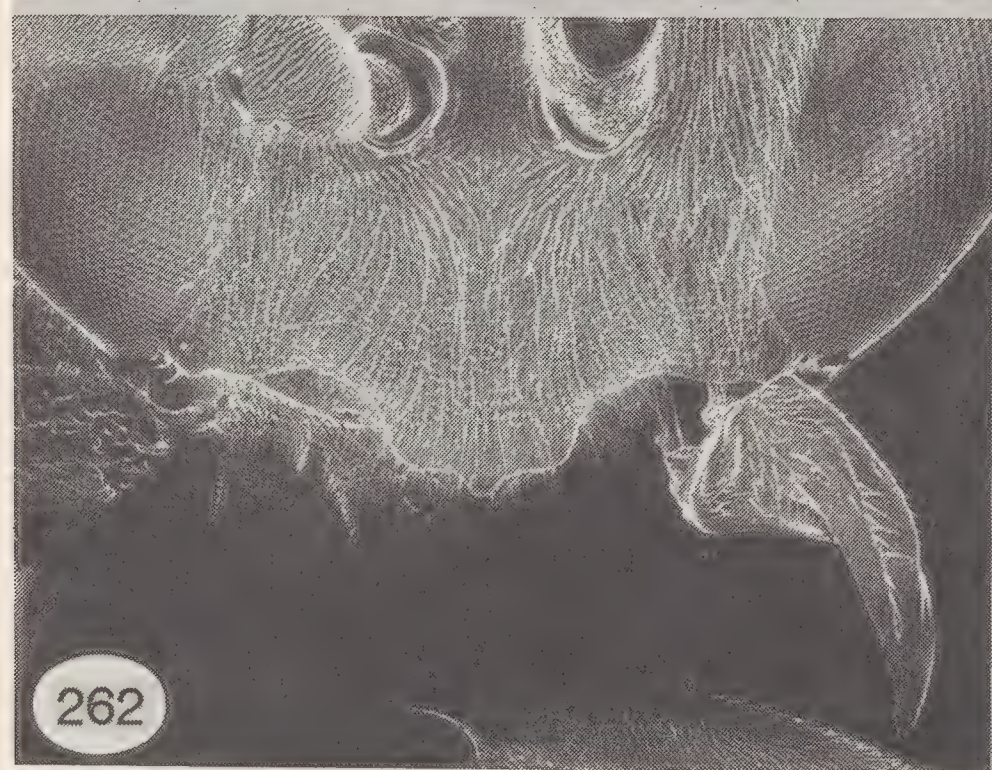
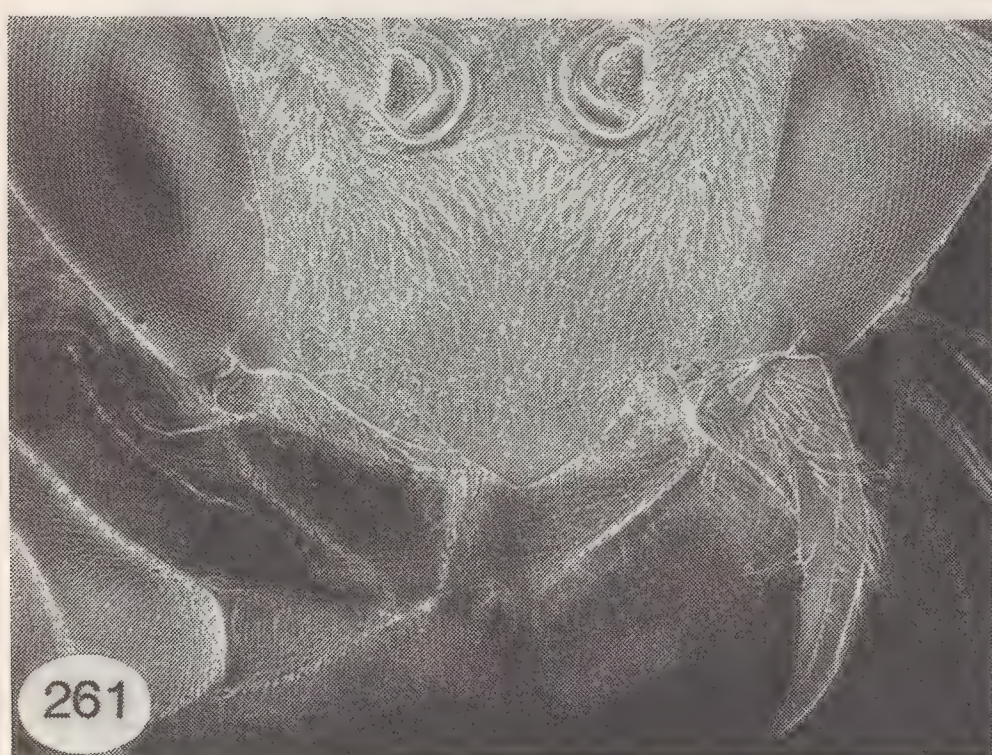
Figures 253-256. Chilense group species. 253, Pison chilense, right forewing. 254-255, male sternum VIII of Pison chilense and sylphe, respectively. 256, three-quarter ventral closeup of male genitalia of chilense showing ventral lobes of gonostyle (arrows).





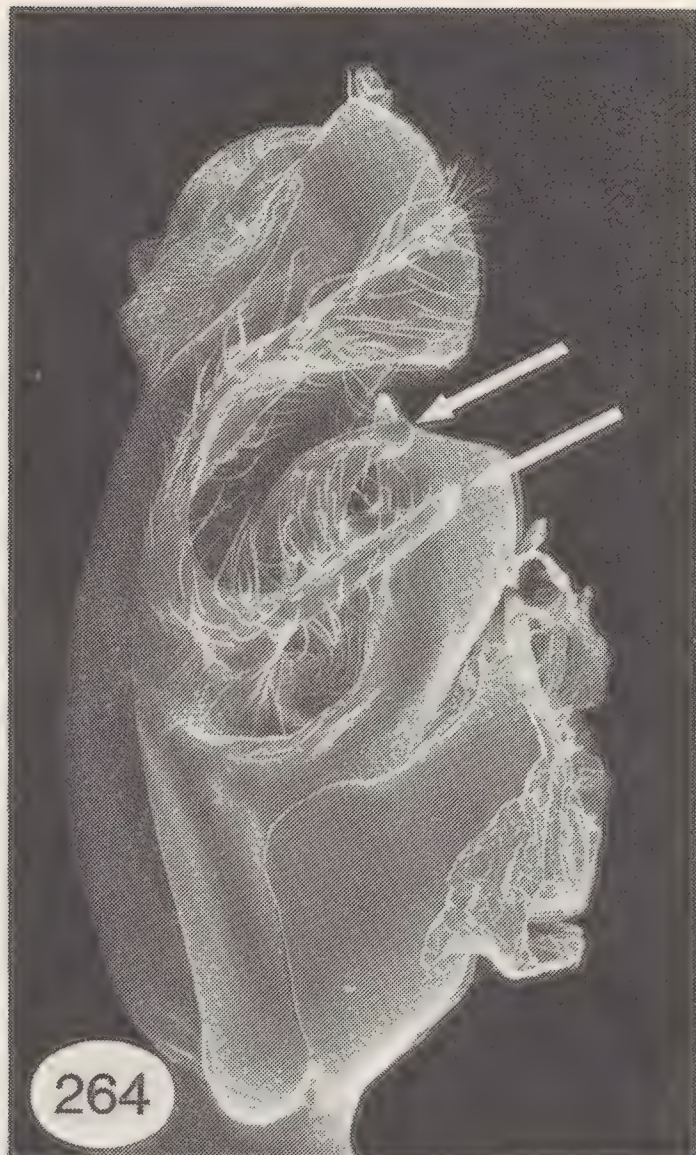
Figures 257-260. *Pison chilense*, male genitalia. 257, lateral view. 258, three-quarter ventral view (arrow indicates midventral lobe of gonostyle). 259, ventral view (arrow indicates lower ventral lobe of gonostyle). 260, dorsal view.





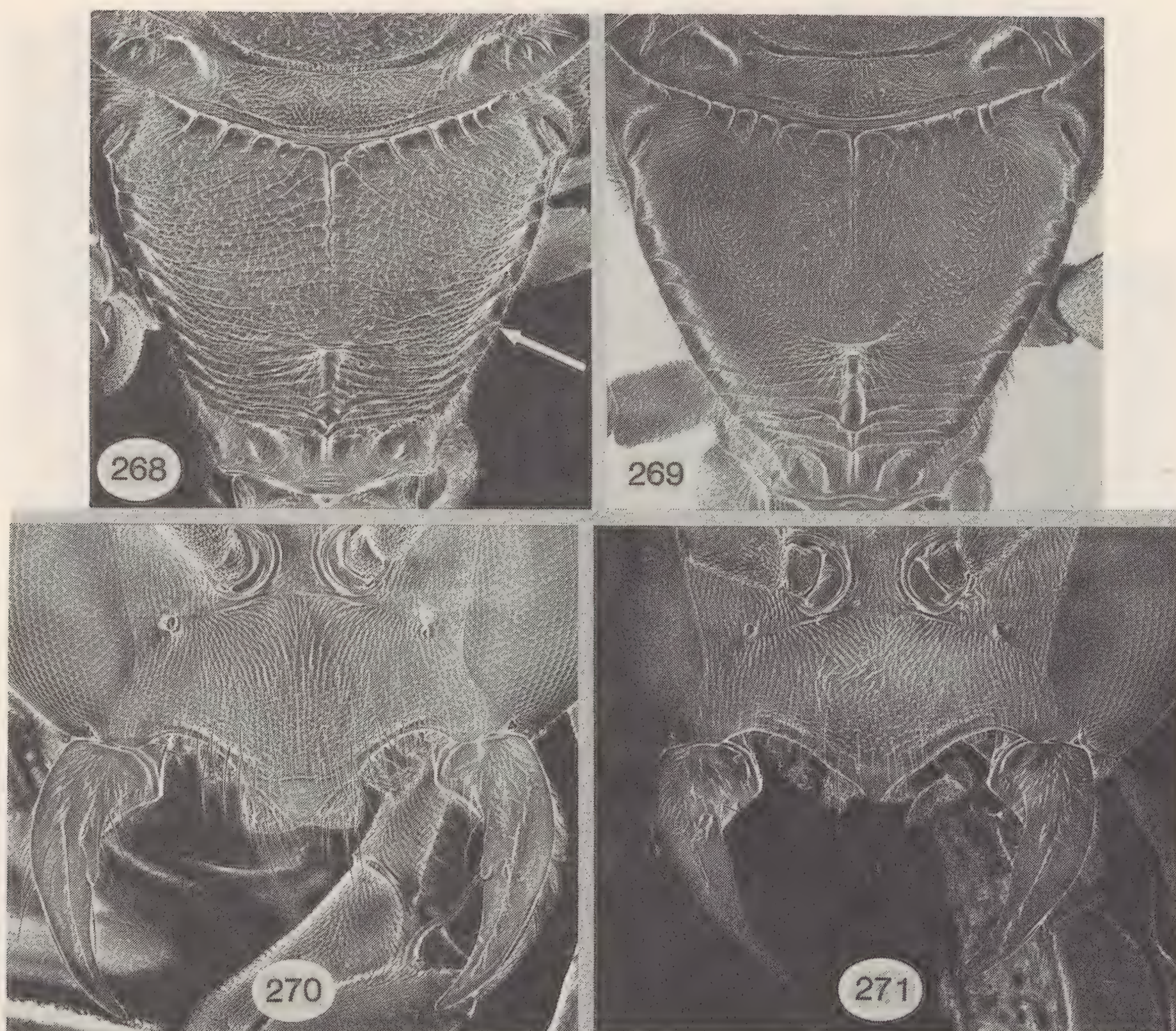
Figures 261-263. Pison sylphe. 261-262, clypeus and mandible of female holotype and male, respectively. 263, propodeal dorsum of female.





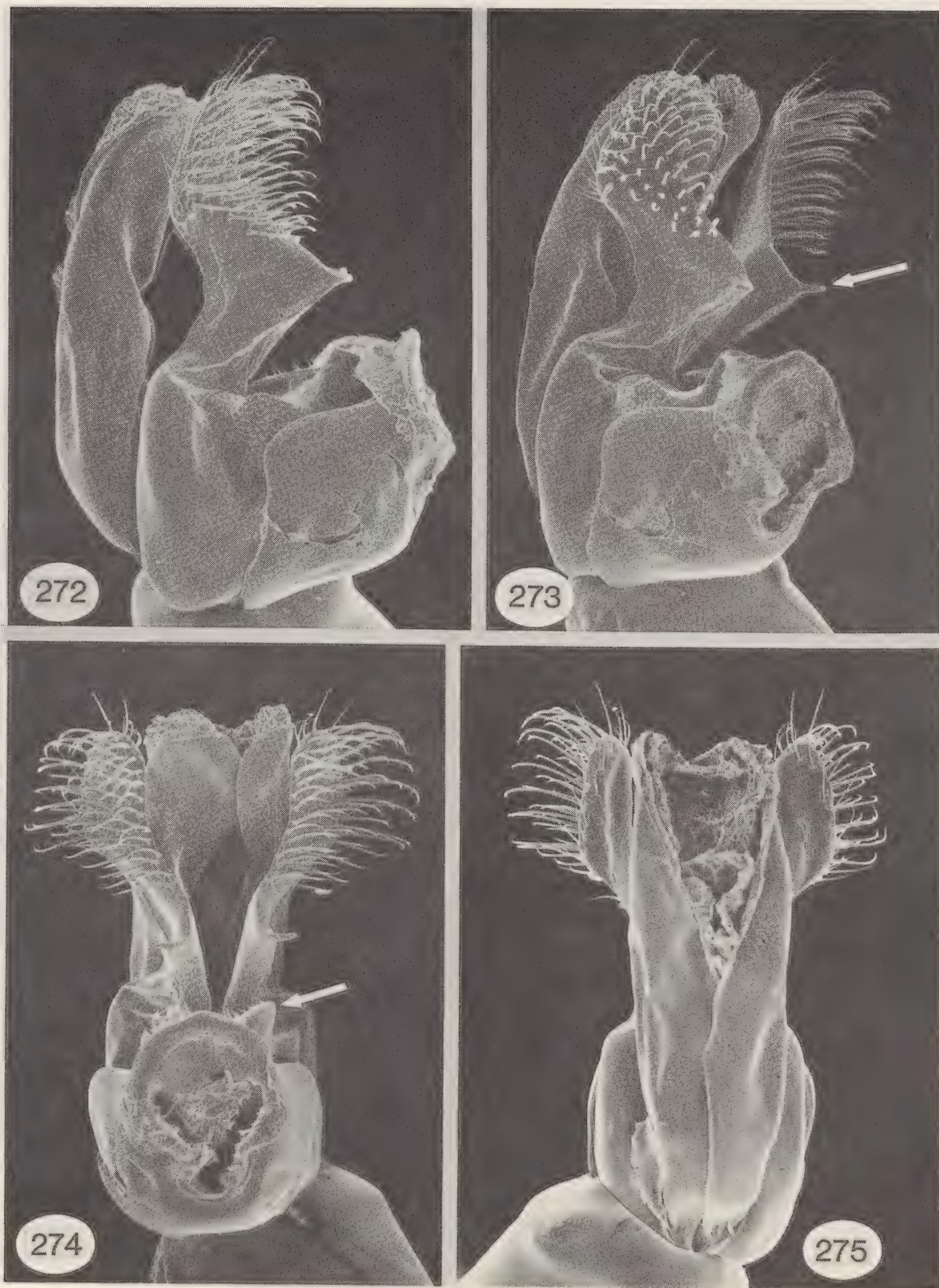
Figures 264-267. Pison sylvae, male genitalia. 264, lateral view (arrows indicate ventral lobes of gonostyle). 265, three-quarter ventral view. 266, ventral view (arrow indicates volsellar lobe). 267, dorsal view.





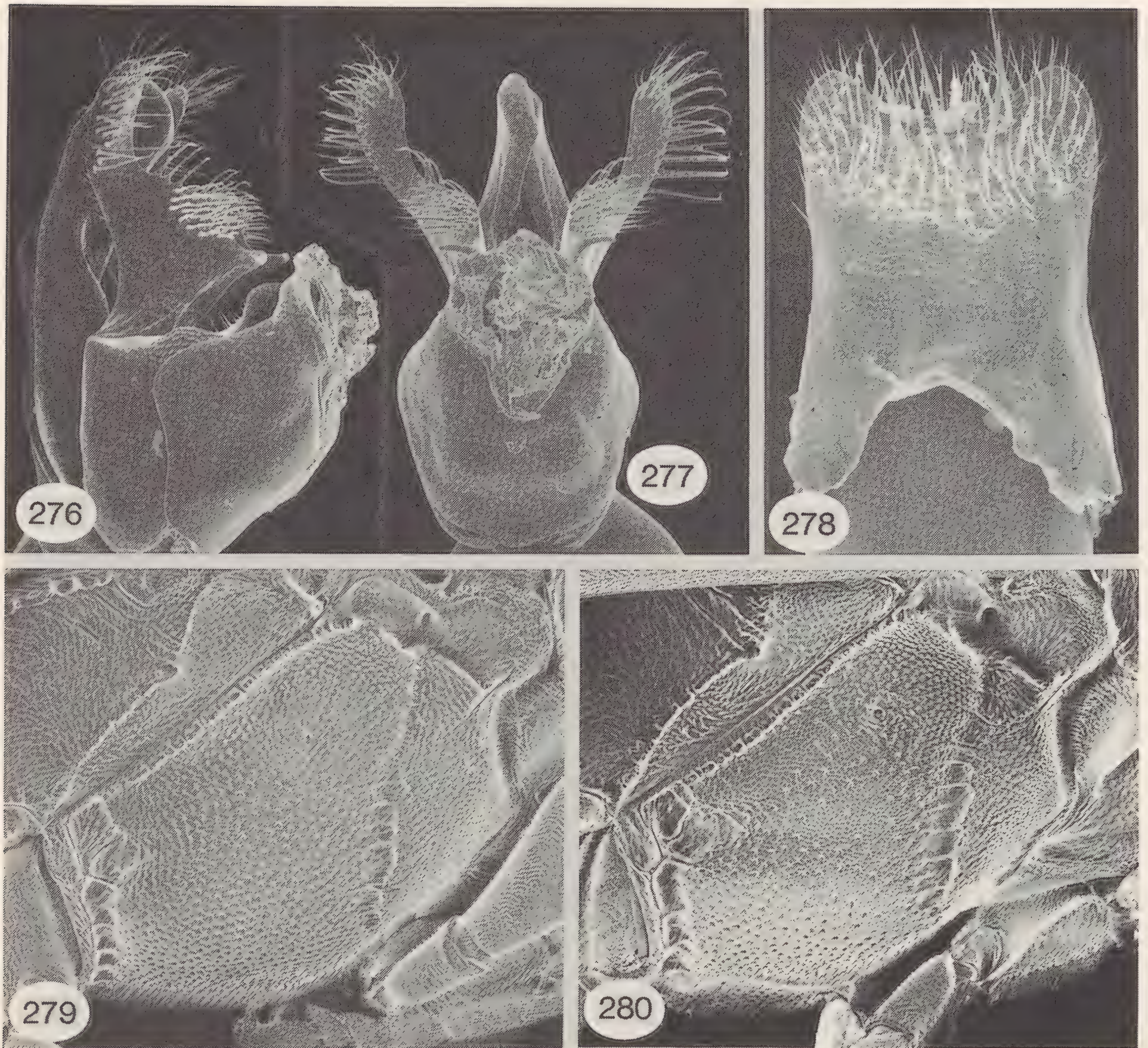
Figures 268-271. Convexifrons group species. 268-269, female propodeal dorsum of convexifrons and cooperi, respectively (arrow points to crenulate ridge that delimits upper part of side). 270-271, clypeus and mandible of convexifrons, female and male, respectively.





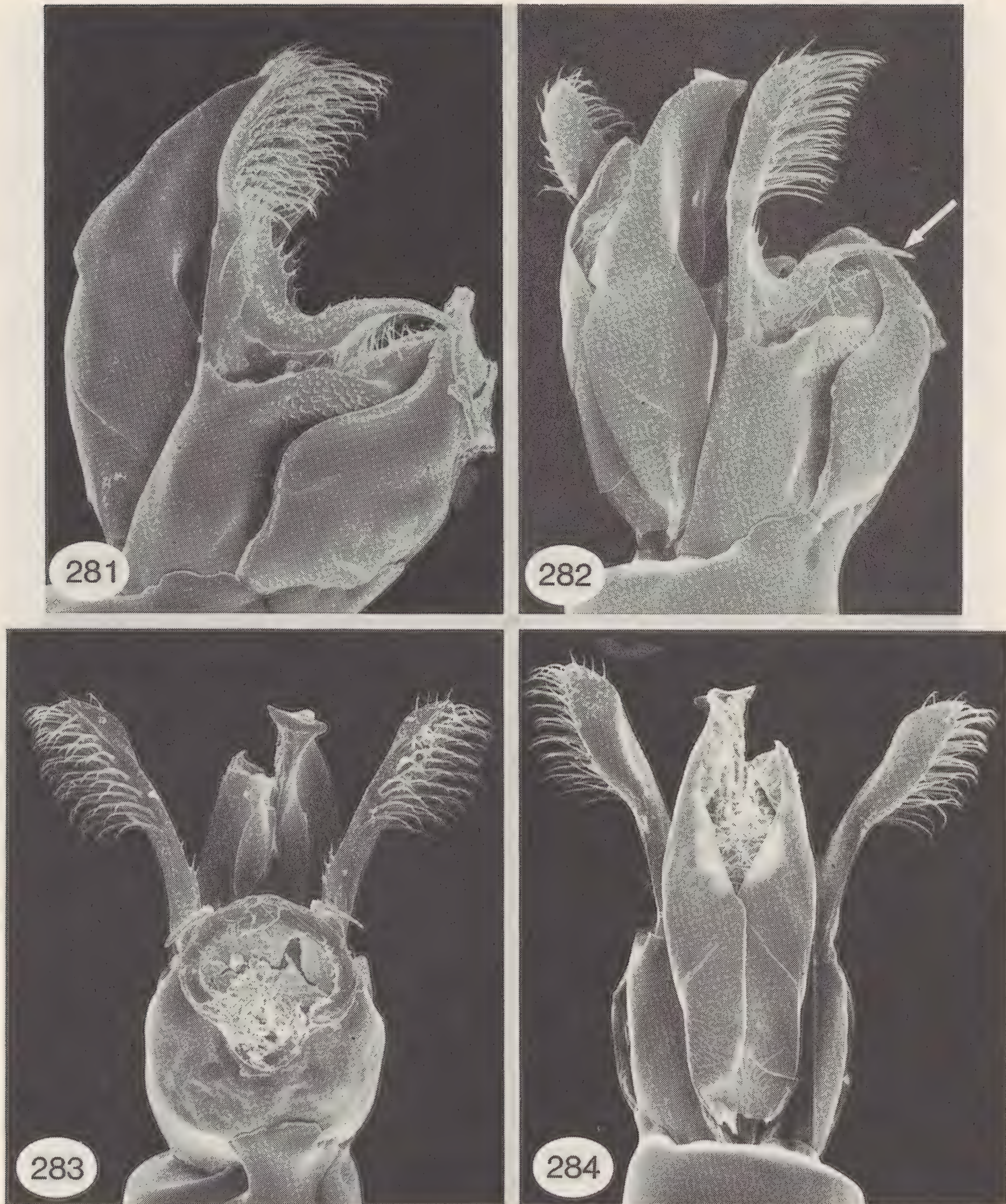
Figures 272-275. *Pison convexifrons*, male genitalia. 272, lateral view. 273, three-quarter ventral view (arrow indicates midventral lobe of gonostyle). 274, ventral view (arrow indicates volsellar lobe). 275, dorsal view.





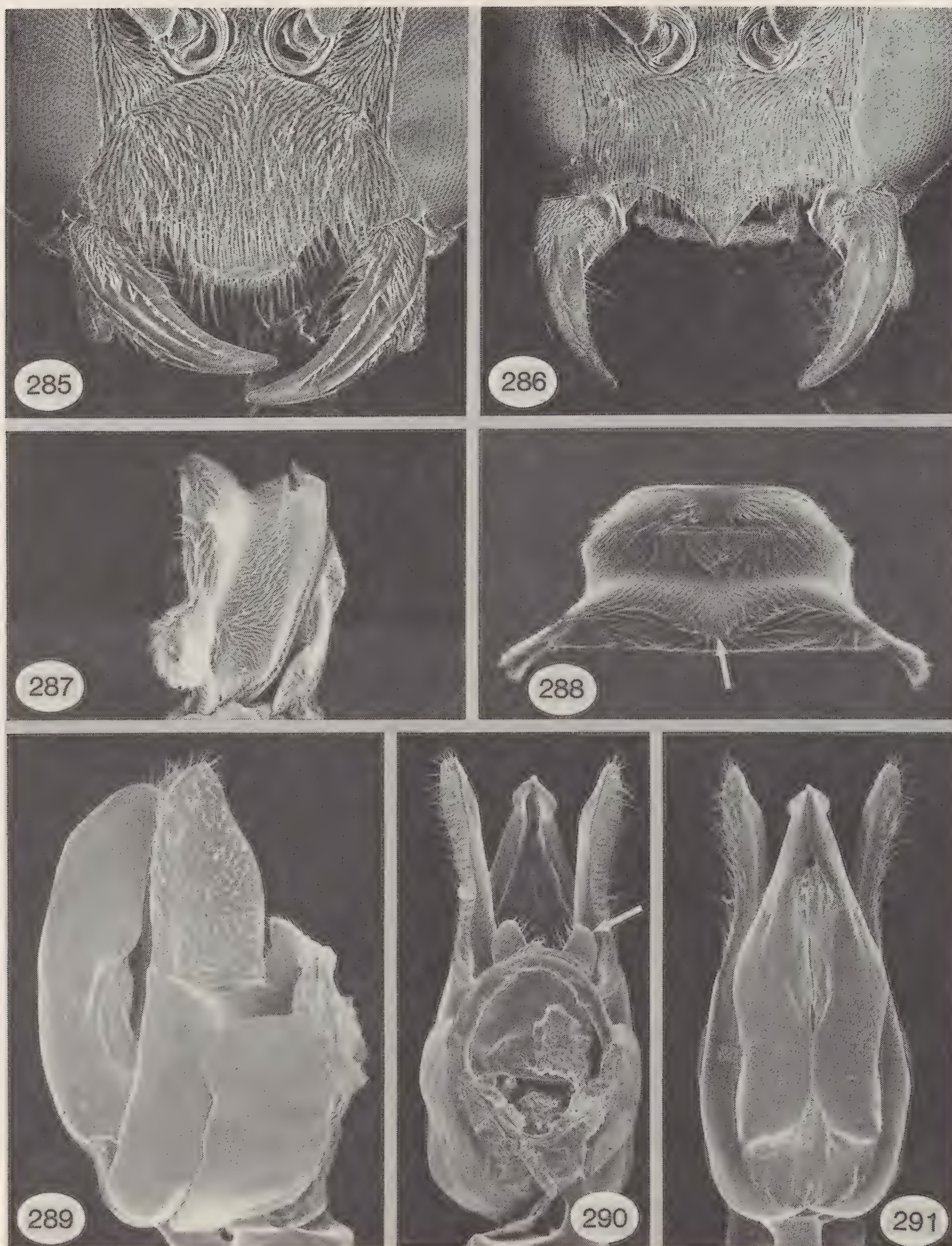
Figures 276-280. Convexifrons group species. 276-277, male genitalia of wasbaueri, lateral and ventral views, respectively. 278, male sternum VIII of cooperi. 279-280, right side of thorax showing punctation of mesopleuron of wasbaueri and cooperi, respectively.





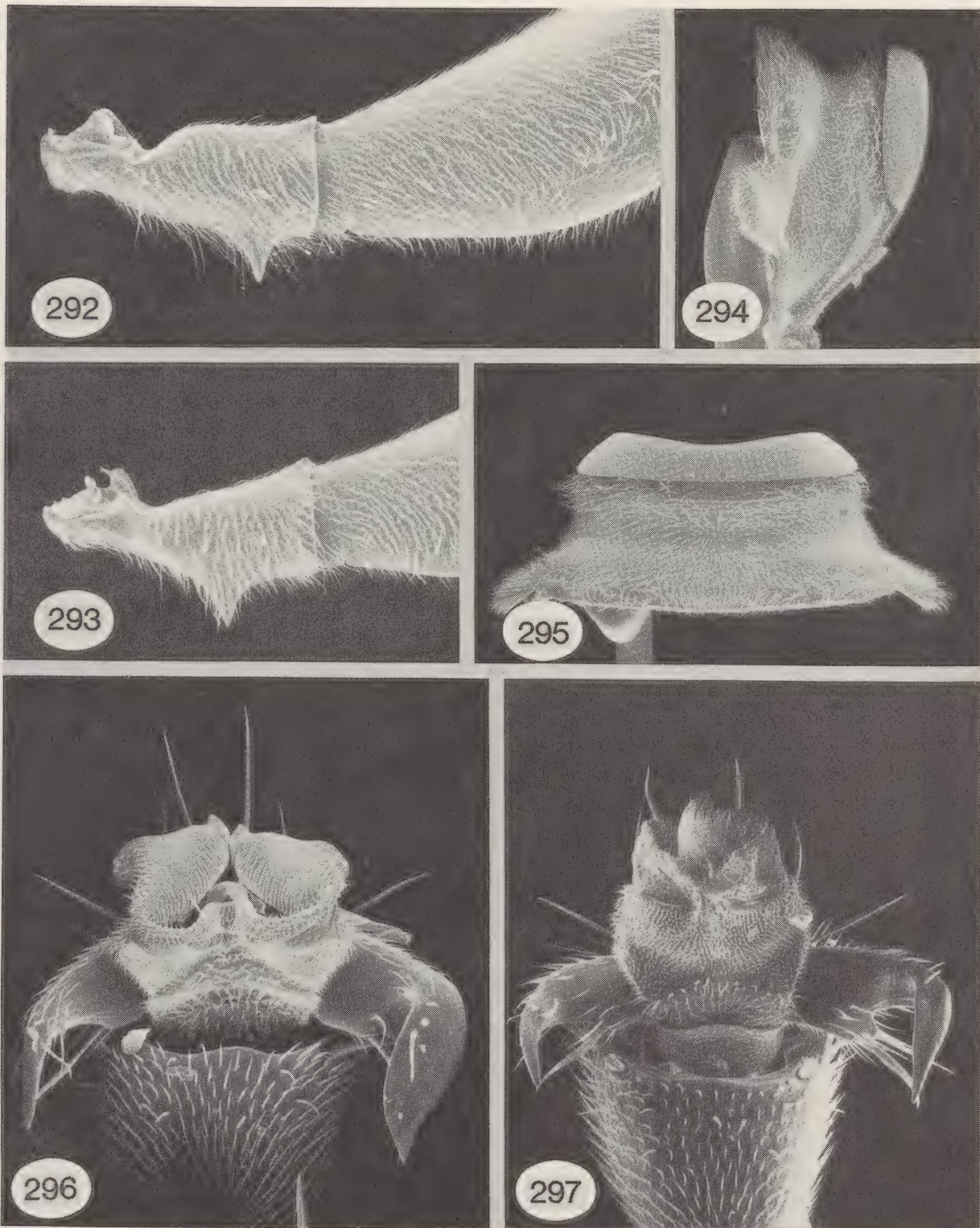
Figures 281-284. *Pison cooperi*, male genitalia. 281, lateral view. 282, three-quarter dorsal view (arrow indicates midventral lobe of gonostyle). 283, ventral view (apex of left penis valve missing). 284, dorsal view (apex of left penis valve missing).





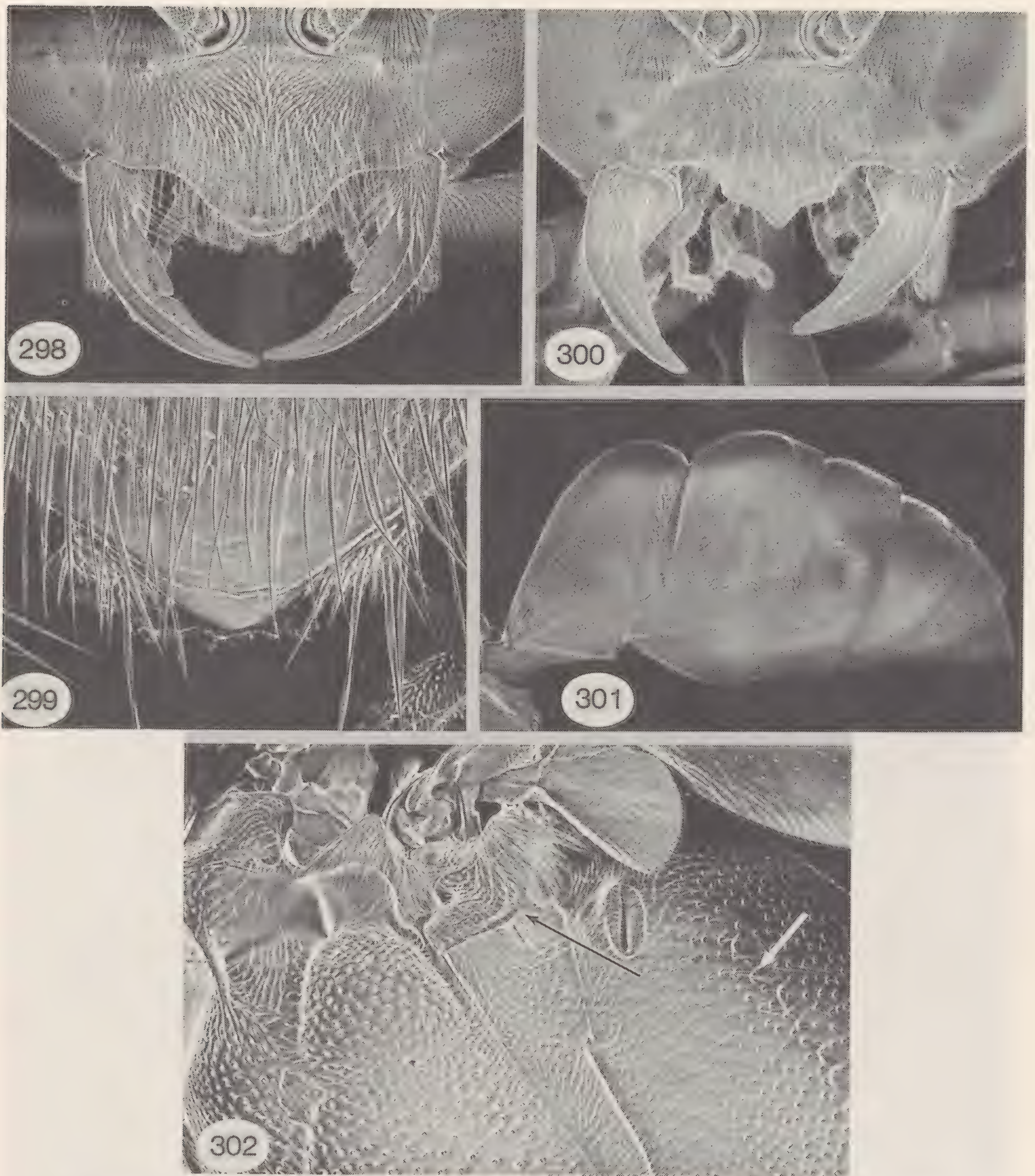
Figures 285-291. *Pison longicorne*. 285-286, clypeus and mandible of female and male, respectively. 287, lateral view of pronotum. 288, dorsal view of pronotum (arrow indicates median prominence of collar). 289-291, male genitalia, 289 is lateral view, 290 is ventral view (arrow indicates volsellar lobe), 291 is dorsal view.





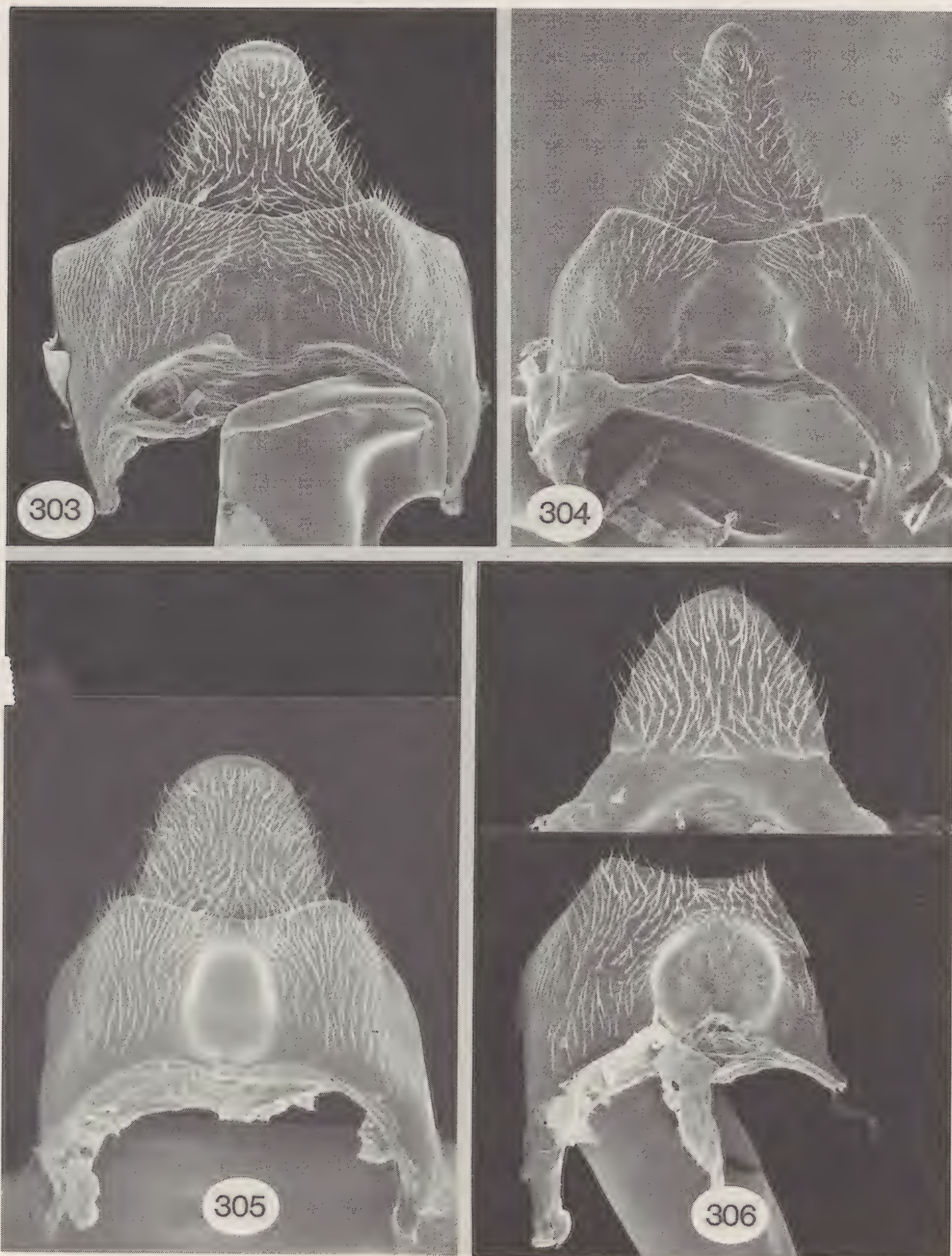
Figures 292-297. Pilosum group details. 292-293, male foretrochanter of pilosum and sphaerophallus, respectively. 294, lateral view of pronotum of pilosum. 295, dorsal view of pronotum of pilosum. 296-297, male right front claws, ventral view, of pilosum and sphaerophallus, respectively.





Figures 298-302. *Pison pilosum*. 298, female clypeus and mandible (specimen from Bolivia). 299, apex of female clypeal lobe (specimen from Trinidad). 300, male clypeus and mandible (specimen from Trinidad). 301, lateral view of female gaster showing constriction between terga I-II. 302, left side of thorax showing metapleural flange (black arrow) and row of foveae on propodeum (white arrow).





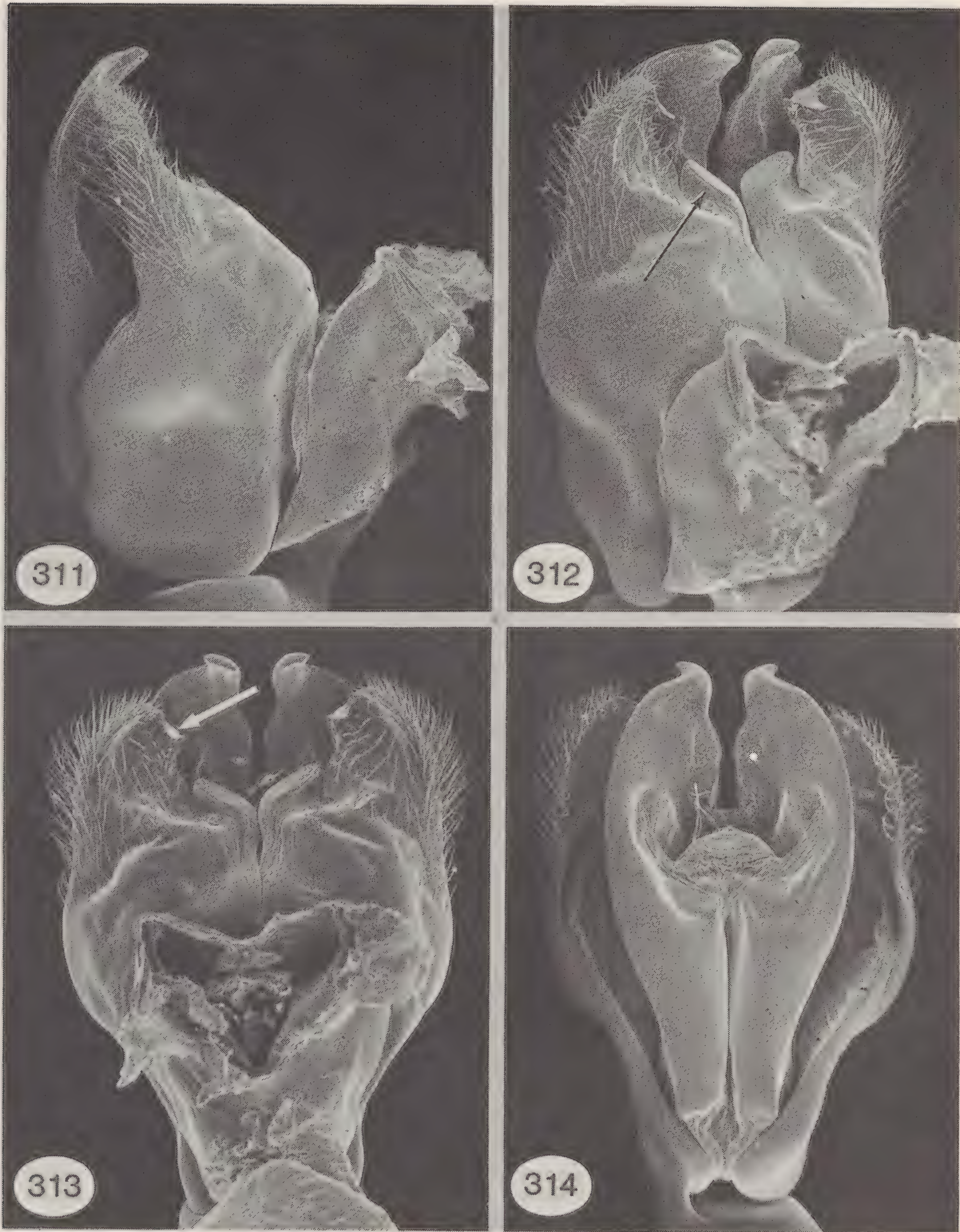
Figures 303–306. Pilosum group, male sterna VII–VIII. 303, pilosum. 304, aureofaciale. 305, vincenti (holotype). 306, oaxaca (holotype).





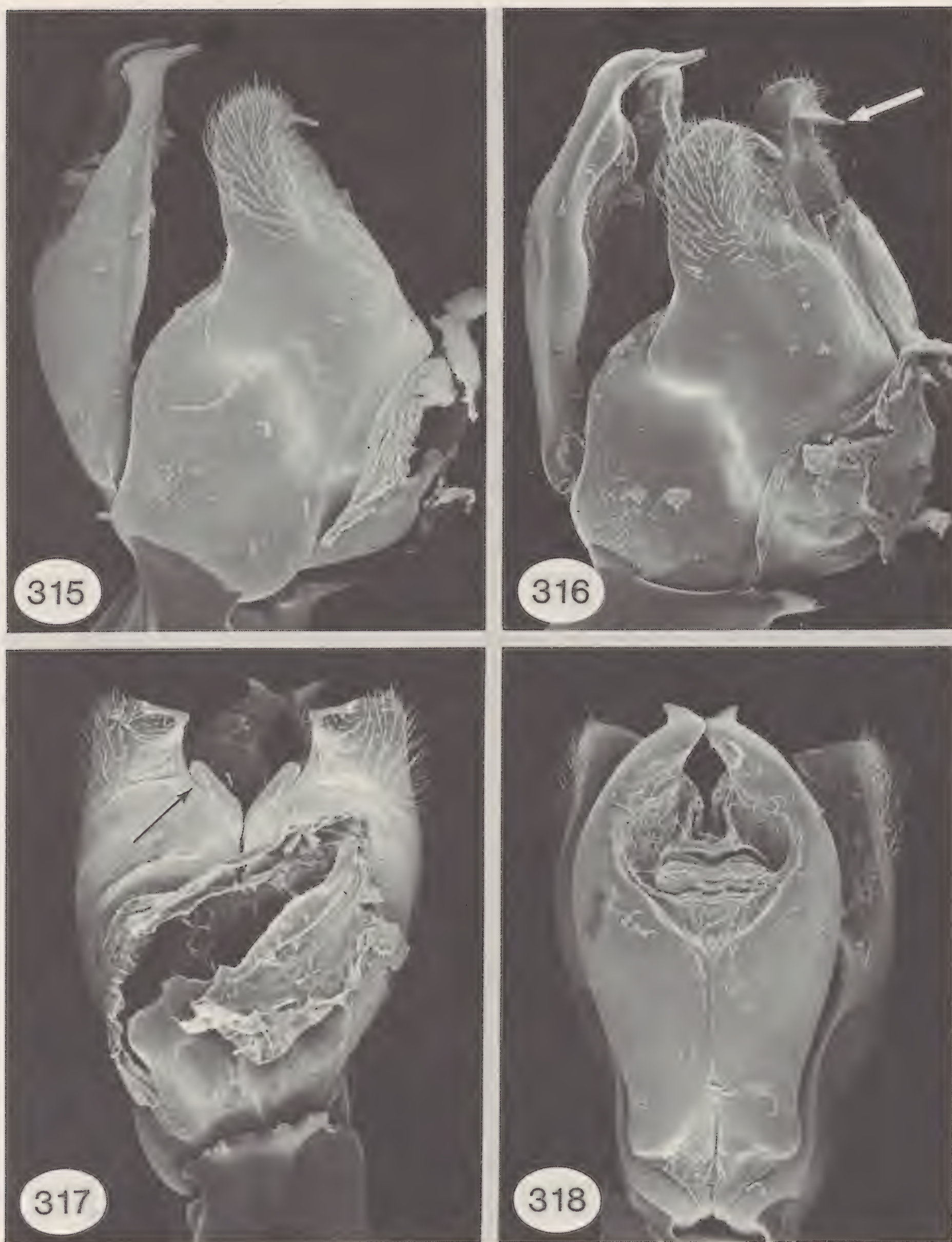
Figures 307-310. *Pison pilosum*, male genitalia. 307, lateral view. 308, three-quarter ventral view (arrow indicates volsellar lobe). 309, ventral view (arrow indicates apical process of gonostyle). 310, dorsal view.





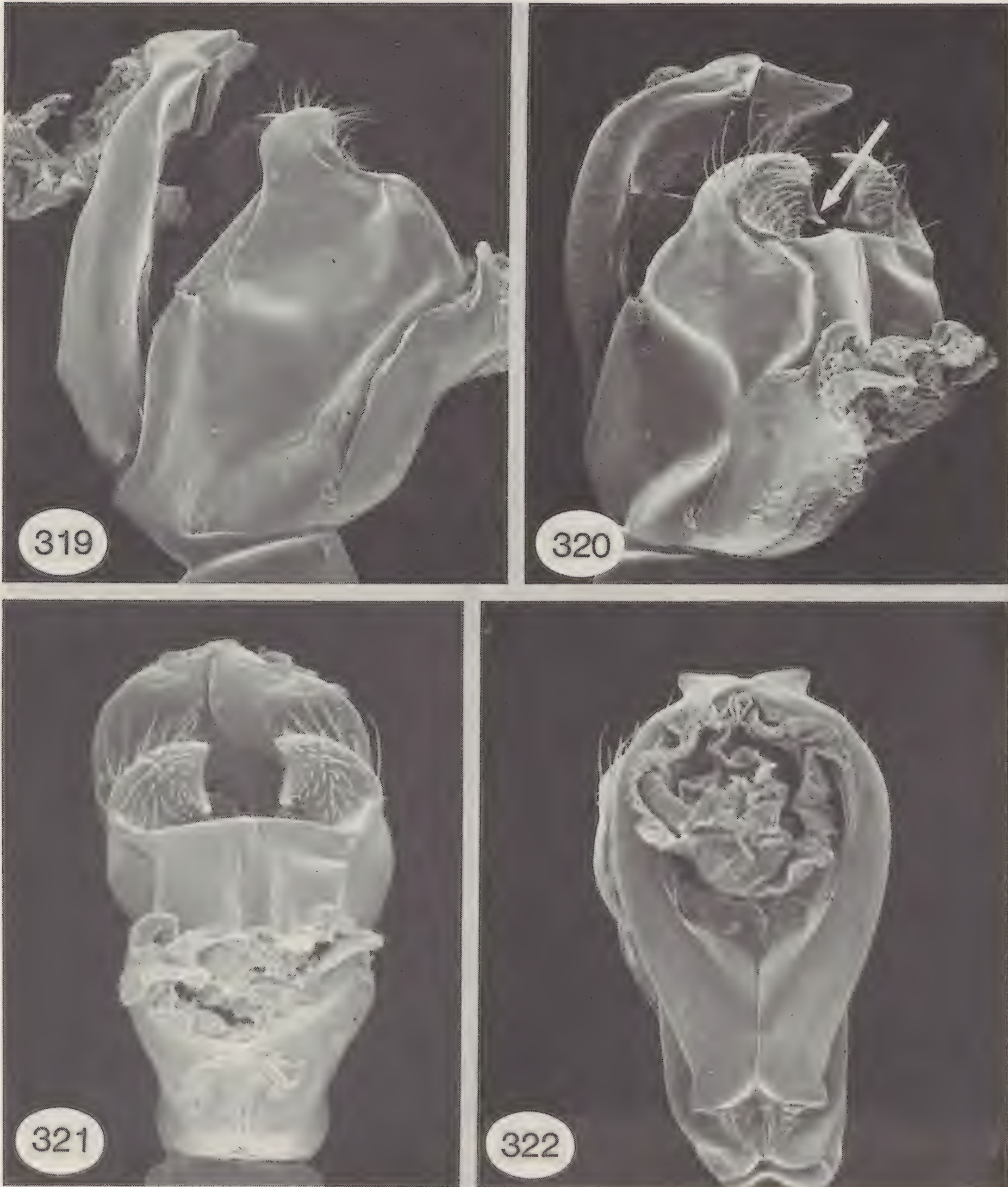
Figures 311-314. *Pison aureofaciale*, male genitalia. 311, lateral view. 312, three-quarter ventral view (arrow indicates volsellar lobe). 313, ventral view (arrow indicates hooklike apical lobe of gonostyle). 314, dorsal view.





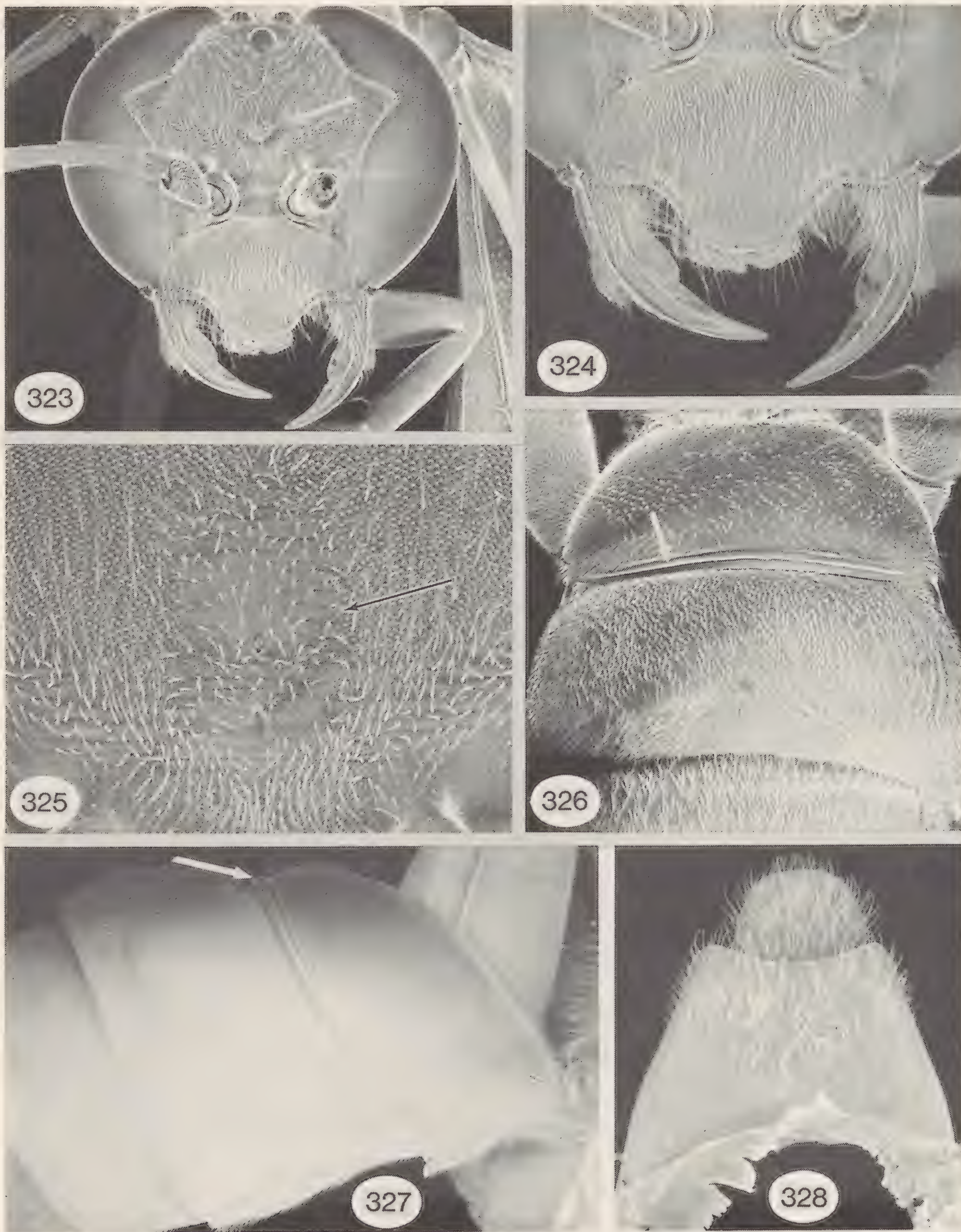
Figures 315-318. *Pison vincenti*, male genitalia (Guyana). 315, lateral view. 316, three-quarter ventral view (arrow indicates digitiform apical process of gonostyle). 317, ventral view (arrow indicates volsellar lobe). 318, dorsal view.





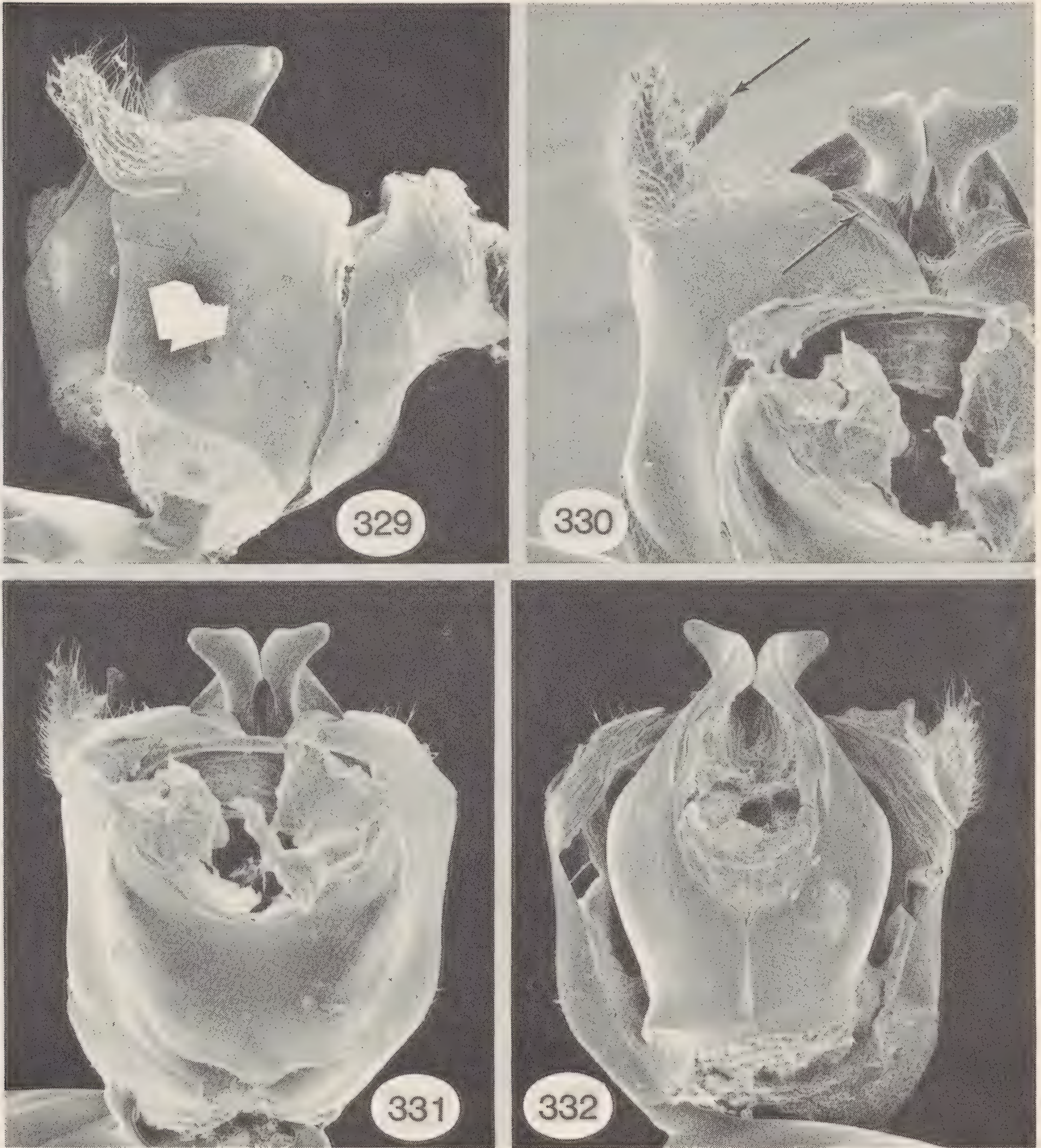
Figures 319-322. *Pison oaxaca*, male genitalia (holotype). 319, lateral view. 320, three-quarter ventral view (arrow indicates spine-like process of gonostyle). 321, ventral view. 322, dorsal view.





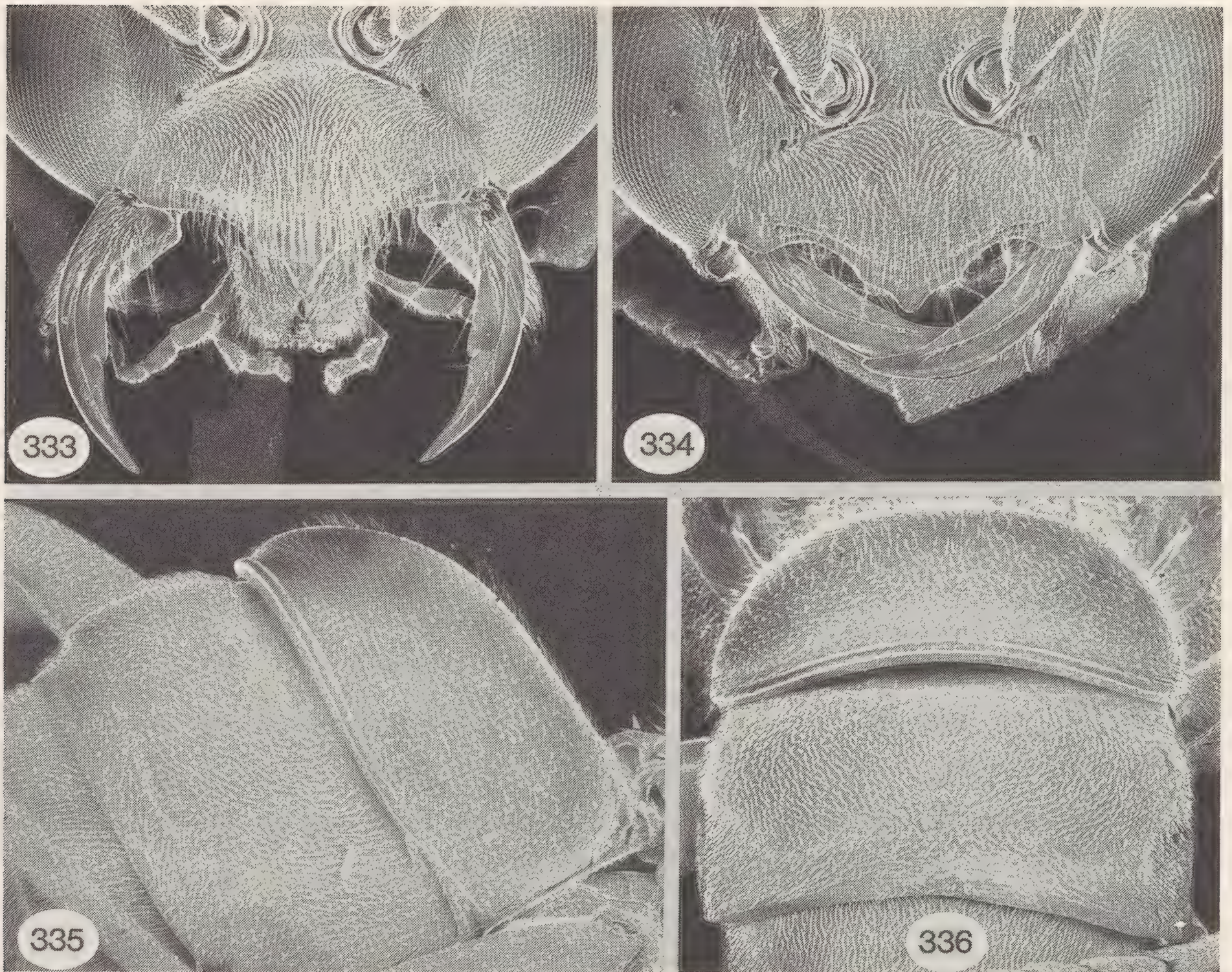
Figures 323-328. *Pison gnythos*. 323, female face (arrow indicates frontal dimple, specimen from Ecuador). 324, female clypeus and mandible. 325, closeup of dimple (arrow) seen in fig. 323. 326-327, terga I-II of female in dorsal and lateral view, respectively (arrow indicates bead-like rim of tergum I). 328, male sterna VII-VIII of holotype.





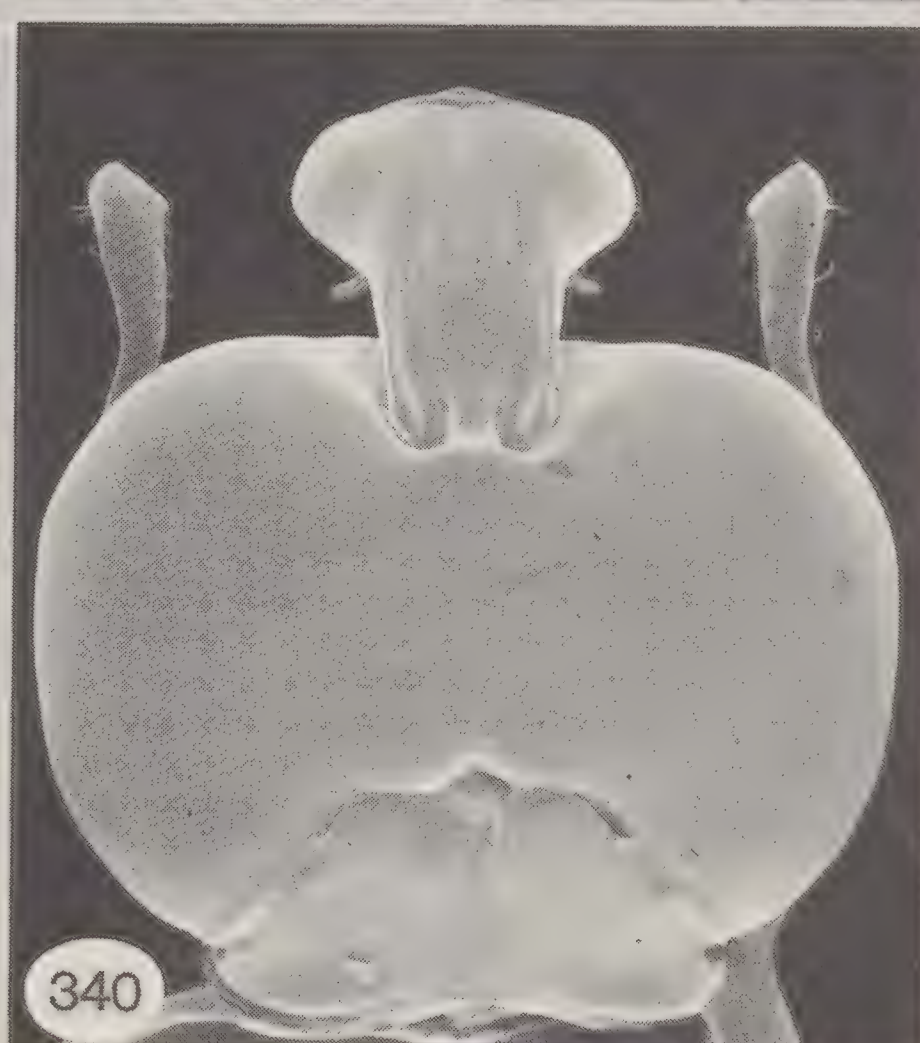
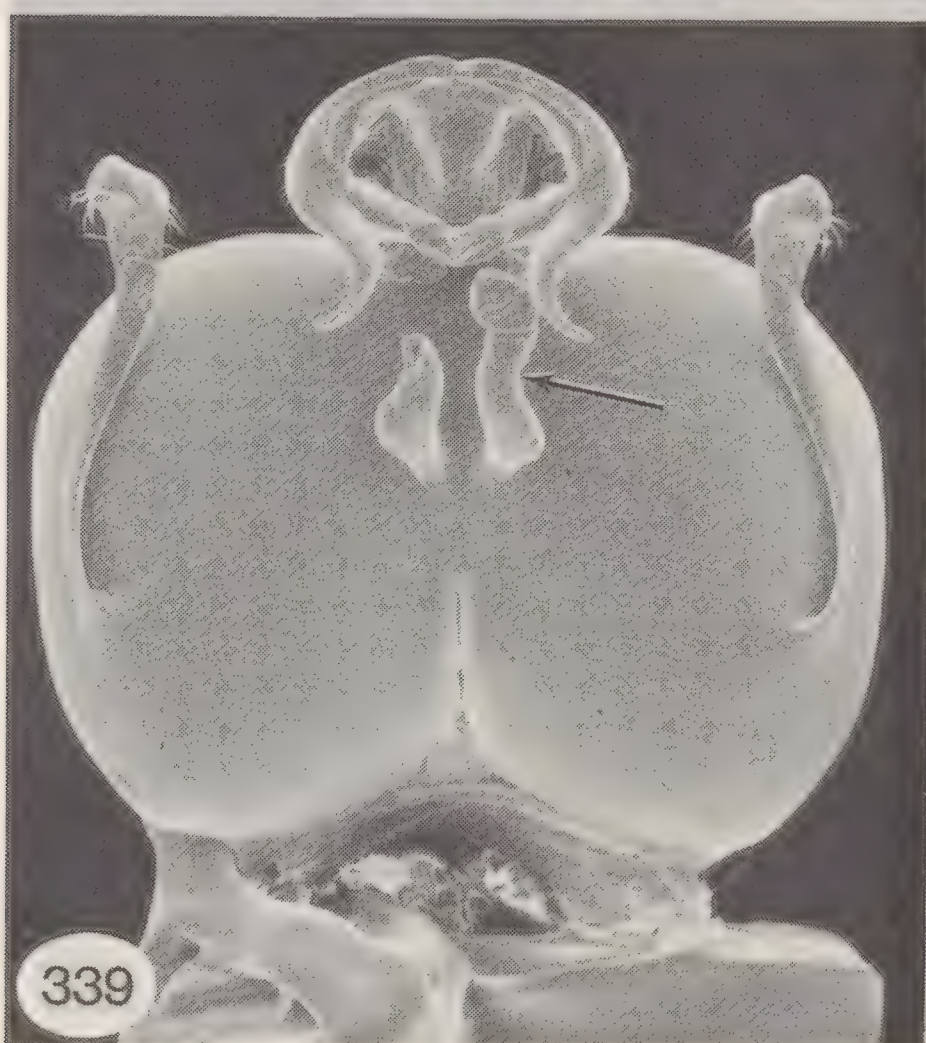
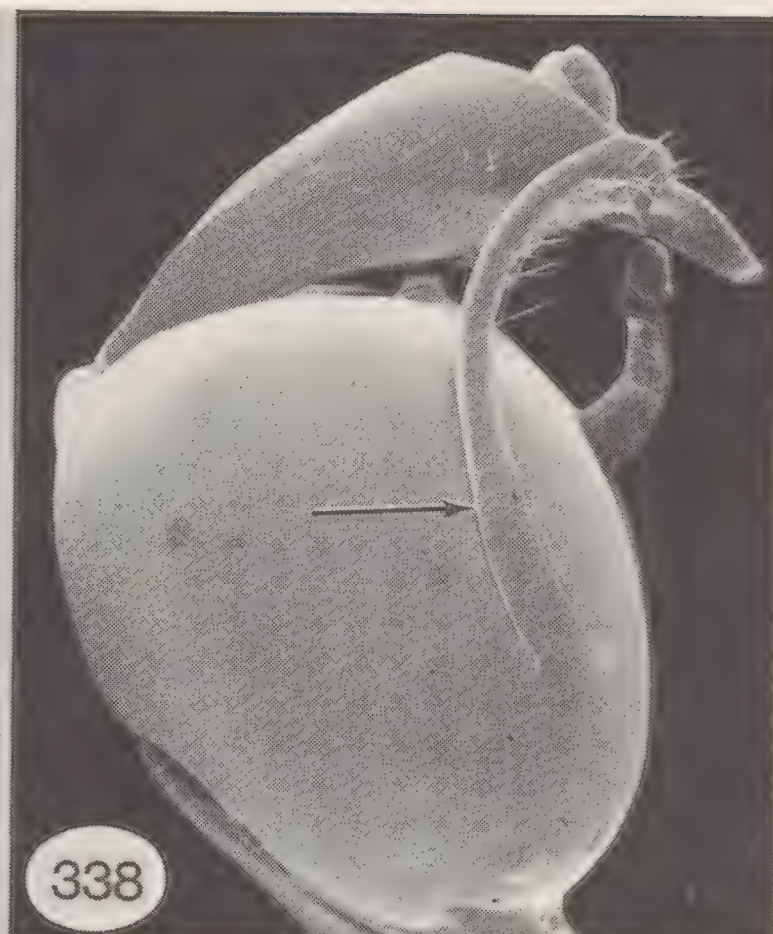
Figures 329–332. *Pison gnythos*, male genitalia of holotype. 329, lateral view. 330, partial ventral view showing hooklike lobe at apex of gonostyle (upper arrow) and volsellar lobe (lower arrow). 331, ventral view (right gonostylar apex missing). 332, dorsal view (right gonostylar apex missing).





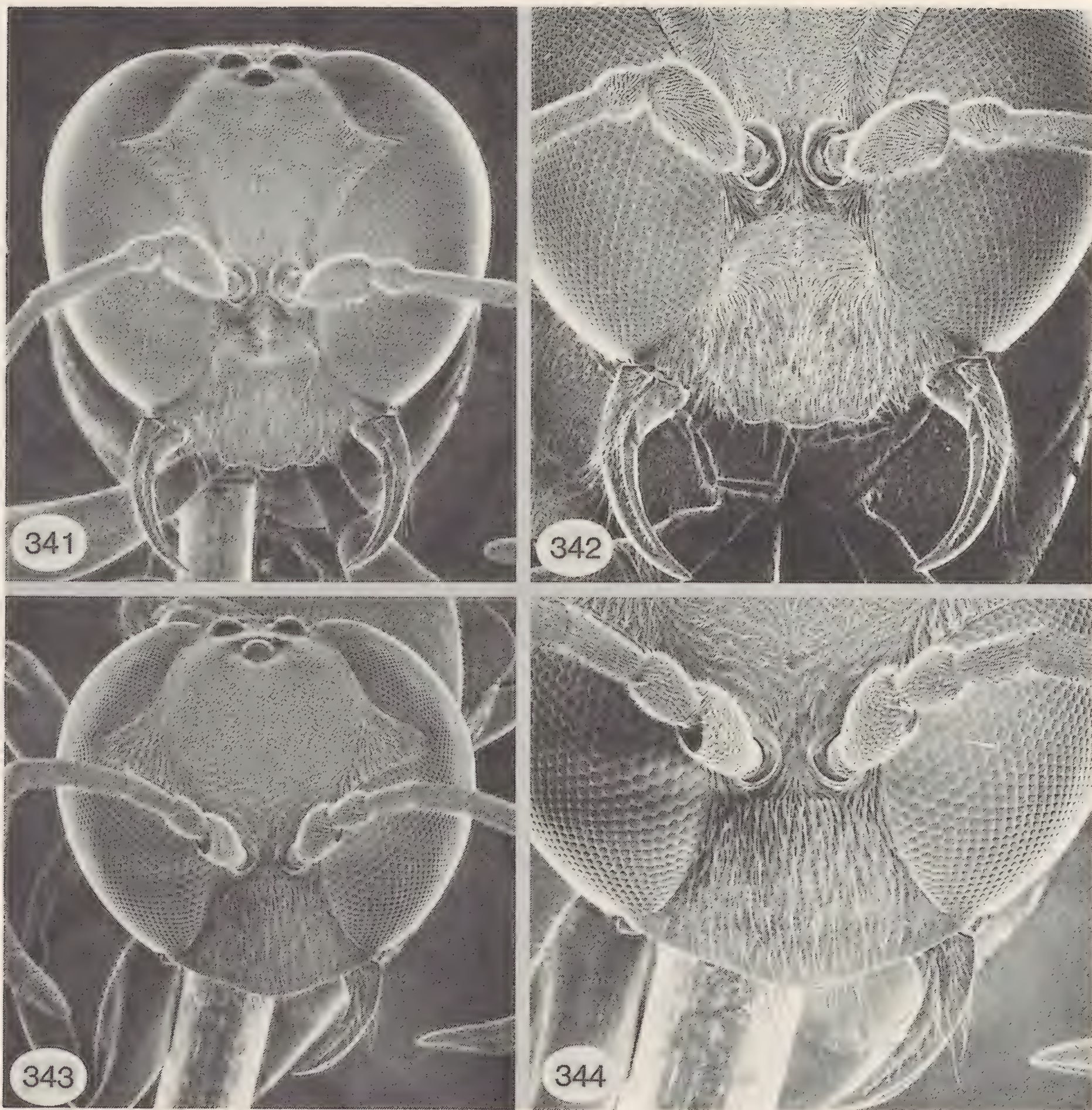
Figures 333-336. *Pison sphaerophallus*. 333-334, female (Guyana) and male (Colombia) clypeus and mandible, respectively. 335-336, female terga I-II in lateral and dorsal view, respectively.





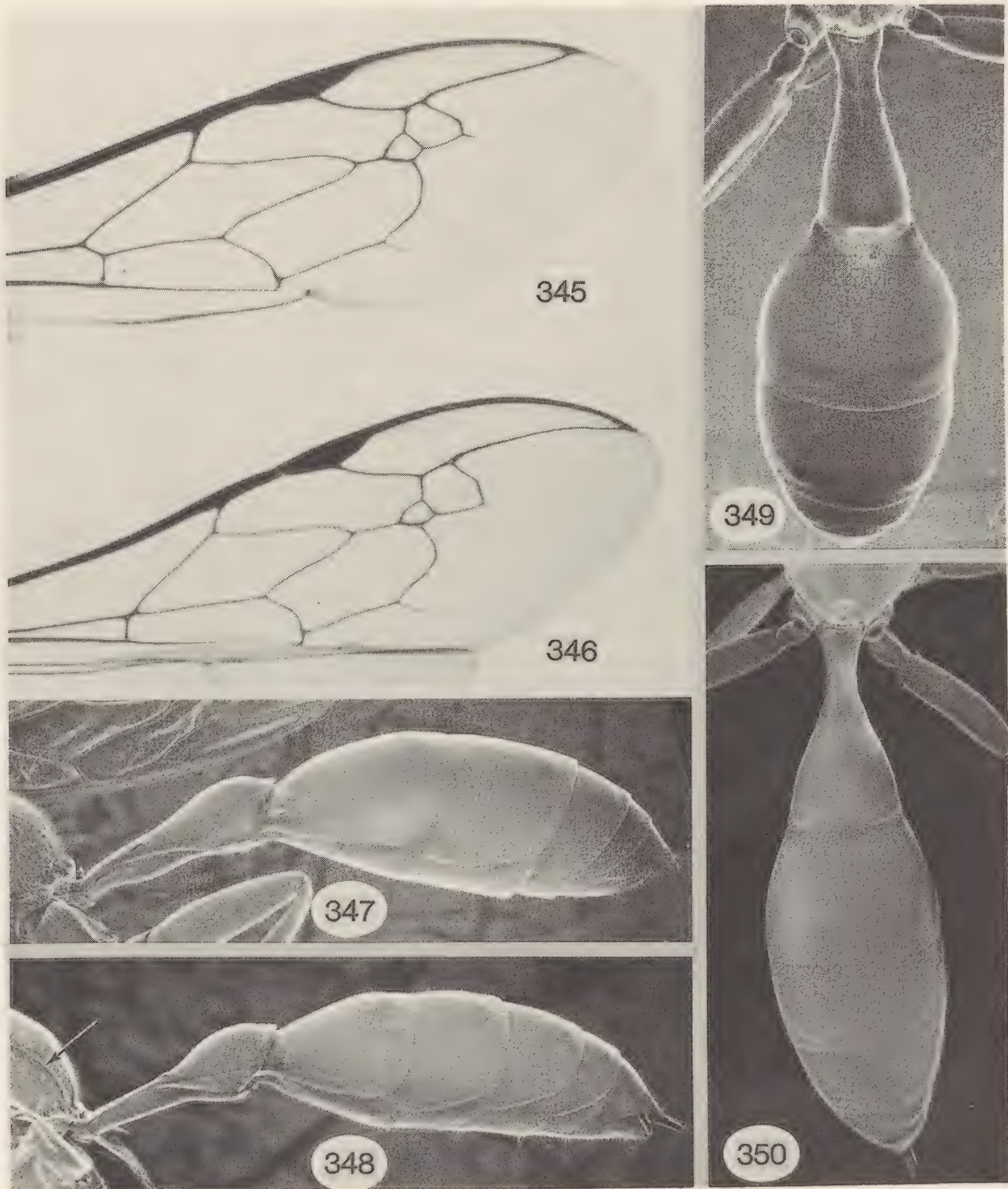
Figures 337-340. Pison sphaerophallus. 337, propodeal dorsum. 338-340, male genitalia, 338 is lateral view (arrow indicates gonostyle), 339 is ventral view (arrow indicates right volsellar lobe, left one is broken), 340 is dorsal view.





Figures 341-344. Pison from New Guinea, facial details. 341, Pison pistillum, holotype, face. 342, Pison pistillum, holotype, lower part of face showing enlarged facets and detail of clypeus. 343, Pison woji, entire face. 344, Pison woji, lower part of face showing enlarged eye facets and outline of clypeus.





Figures 345–350. Pison from New Guinea. 345–346, forewing of pistillum (holotype) and woji, respectively. 347–348, lateral view of end of propodeum and entire gaster of pistillum (holotype) and woji (arrow indicates propodeal carina). 349–350, dorsal view of gaster of pistillum (holotype) and woji.